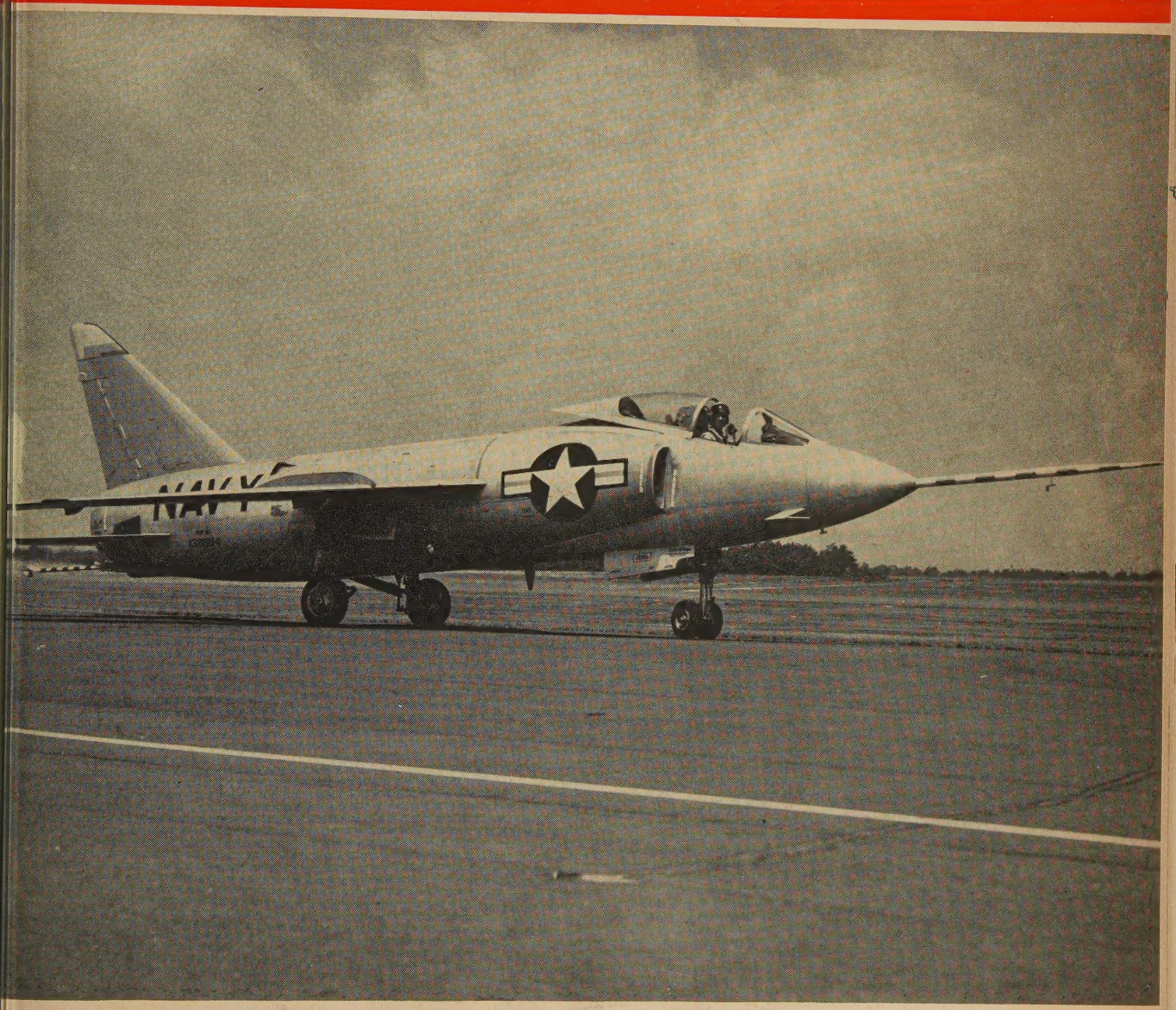
Skyways

Flight Operations • Engineering • Management

SEPTEMBER 1954



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REMEMBER that wonderful feeling of elation and discovery when you made your first trip with the Lear L-2 autopilot? . . . the relaxed comfort . . . the freedom from fatigue . . . the absence of strain . . . the unerring navigation . . . the reassuring assistance and security in "weather"?

That is just the *beginning* of what the L-2 can do for you! With the addition of the Model 937 controller and several other accessory units, instrument pilots now have a *truly all-weather* autopilot. With push-button simplicity you can make *automatic* ILS approaches, on both localizer and glide path beams, to within feet of the runway. If you wish, you can discontinue your automatic approach at any time and your plane will still be in proper trim to complete the approach. You can level out *automatically* at any pre-selected altitude and be sure your holding pattern will *remain* at that altitude. And with all this, you still have all the other great benefits of the L-2 as a stabilizing and maneuvering autopilot.

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Automatically maintains the aircraft at the altitude you select, regardless of normal turbulence, turns, or CG changes. Press the button and your plane levels off smoothly, positively, and automatically.

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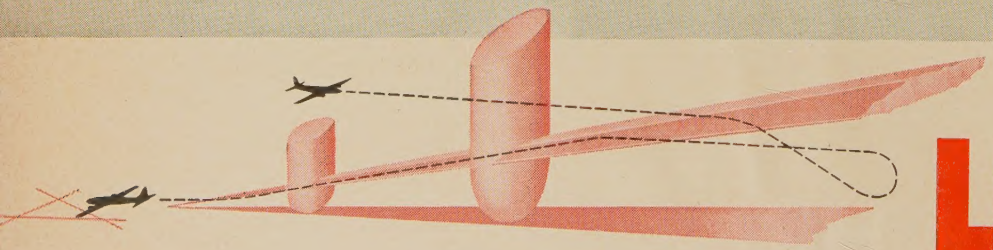
A safety feature that automatically prevents sudden nose-up or nose-down attitude when the autopilot is engaged. The pitch trim of the autopilot continually and automatically follows the pitch attitude of the airplane, even with the autopilot engage switch off.

LC-14



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SEPTEMBER, 1954

Skyways

Flight Operations • Engineering • Management

Cover: Navy's new Grumman F9F-9 tiger

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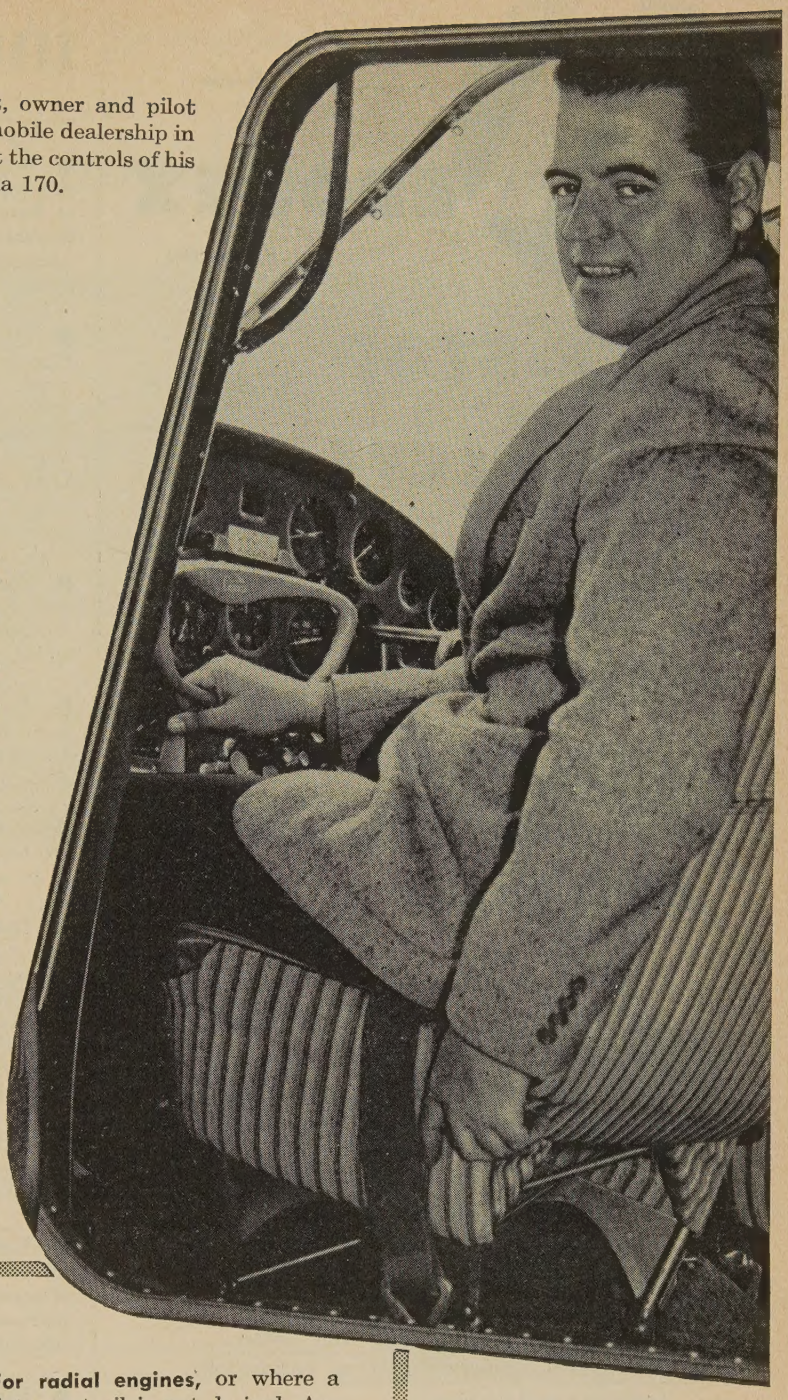
Harold K. Kurtz, owner and pilot for his own automobile dealership in Kutztown, Pa., at the controls of his Company's Cessna 170.



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"21 years of flying and more than 4,500 flight hours have taught me that Gulf delivers the goods. In flying all over eastern United States, I've used Gulf Aviation Products exclusively for the last 8 years."

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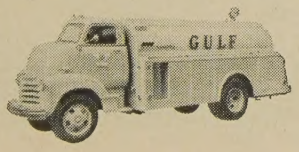

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industry notes . . .

■ Republic Aviation has purchased the 424,000-square foot factory building owned and operated by Fairchild Engine Division at Farmingdale, Long Island, N. Y. The purchase will enable Republic to consolidate essential engineering and experimental operations closer to home. Fairchild will relocate at an announced site in Suffolk county, also Long Island, N. Y.

■ The state of Nebraska has placed at order with Wilcox Electric Company for six VOR stations to be installed at Ainsworth, Alliance, Norfolk Scottsbluff, Lincoln and O'Neil. The Ainsworth station will be the Wilcox Type 483 (200 watt) while the other five will be Type 482 (50 watt). Minnesota was the first state to purchase VOR's and, since all previous domestic civil VOR's have been installed and maintained by the CAA, the action of Nebraska and Minnesota marks the beginning of a new trend toward state navigational aids.

■ The Air Force has placed a production order with Sperry for Zero Reader flight systems to be installed in interceptors and transparent aircraft. The quantity of this order is in excess of $2 million.

■ Accessory Overhaul Industries, Inc., is moving both its Richmond Hill and New Cassel plants to Westchester County Airport. The acquisition of the fixed-base operations at Westchester enables Accessory Overhaul Industries to provide a complete service for the transient, from closing the flight plan, gas and oil, cleaning, pilot and operations room, passenger lounge, hospitable assistance and guidance to having the aircraft ready for departure at an appointed time.

■ The Army Signal Corps has signed a contract with Summers Gyroscope Company of Santa Monica, Calif., for the development of two lightplane autopilots. The first system is to be a single-axis autopilot designed to control aircraft solely about its roll axis, while the second is to be a two-axis autopilot to control a lightplane about both roll and yaw axes. Summer also has a joint Air Force Signal Corp contract to develop a full three-axis autopilot.

■ TEMCO Aircraft has received an Air Force contract to overhaul and modify 40 T-6G trainers to LT-6G specifications, a liaison version of the trainer.

■ Lockheed's turboprop's, the R7V-2 and the C-130, were scheduled for first flights in August, while the company's XFV-1 interceptor is not expected to begin vertical take-offs and landings until late this month (September). Convair's XFY-1 is also scheduled for its first full flight this month.

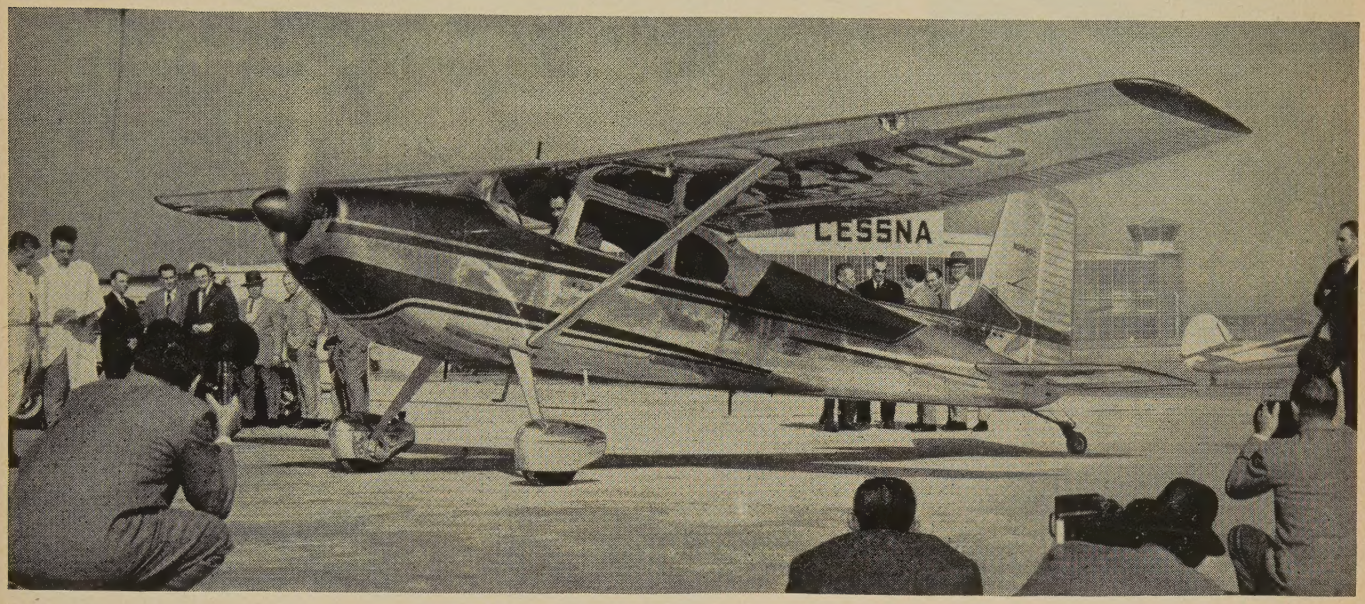
■ Fairchild C-119 *Flying Boxcars* are replacing the C-47 as a tactical unit support aircraft throughout the Strategic Air Command of the USAF. SAC reported recently that C-119's already were in operation at Turner, Limestone and Carswell AFB, and within the next three months (October or November), *Flying Boxcars* will be received at Ellsworth, Walker, Fairchild, Travis, Biggs and Dow Air Force Bases. The aircraft will be used as cargo and personnel transports.

■ The USAF has ordered a number of "flying laboratories" similar to the Convair 340 to serve as test planes for electronic equipment. Designated C-131B's, the planes are now in production at Convair's San Diego plant. First of the fleet will be delivered late this year.

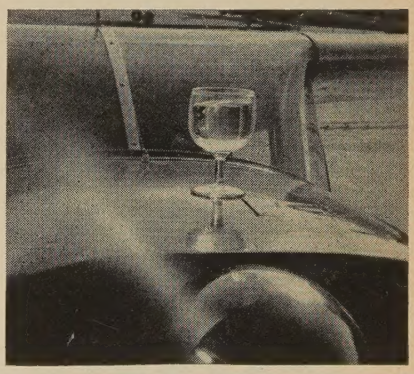
■ Pacific Airmotive has opened a Denver branch at Stapleton Airfield. James Staker has been transferred from PAC's Kansas City office to head up the Denver operation. At Linden, N. J., PAC recently closed its engine overhaul facility. All sales activity, however, will continue unchanged. Decision to close the Linden engine shop was result of economic conditions affecting this operation. Employees had been on strike for some time.

Top Performer . . . Cessna 180 Businessliner

It's '54's "Smoothest" Airplane



America's most widely acclaimed new airplane—the powerful Cessna 180—now offers you greater performance, beauty and value than ever in a brilliant 1954 model! Completely service-proved—refined and improved in dozens of ways, it's quieter and smoother, cruises over 150 m.p.h., offers full 4-place comfort, brilliant new interior and exterior colors and styling and yet the Cessna 180 is still $6000 *under* the nearest competitor. Only $12,950!



Smoothest Power Possible

. . . So smooth that when the engine is running, you can even rest a glass of water on the cowling without disturbing the water! . . . flashing 6-cylinder power with automobile economy. Eight brand-new engine improvements.

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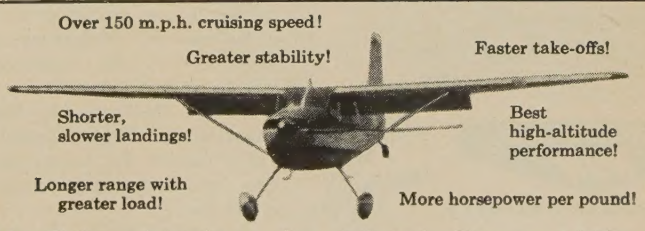
"Living Room" Comfort Aloft

Step in! Stretch out! Here you'll find more foot and leg room, more over-all comfort than in any other airplane in the 180 class. A powerful heating-ventilating system keeps you comfortable in every season, at every altitude.



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now hear this . . .

PERSONNEL

Harold Nutt recently was named Vice President and General Manager of the Borg & Beck Division of Borg-Warner Corp., Chicago.

F. Penn Holter has been appointed assistant to John R. Alison, administrative vice president of Northrop Aircraft.

W. P. Ralston has been named project division engineer for the Lockheed XF-104. Assisting Mr. Ralston are **R. F. Boehme** and **E. D. Palmer,** assistant project engineers, and **John Gilbert,** project administrator.

Kermit A. Day was appointed manager of the B-58 assembly at Convair-Fort Worth. **Eugene E. Finch** replaces Day as moderization manager.

James E. McGuire recently was elected Assistant Comptroller of Pan American World Airways.

Robert J. Trivison has been appointed Production Manager of Hydro-Aire, Inc., Burbank, Calif.

Roy T. Hurley, president of Curtiss-Wright, and **Richard S. Boutelle,** president of Fairchild Engine and Airplane Corp., have been named to the Advisory Board of the International Aviation Trade Show. Also serving on the Board are **E. M. Benham** of Sikorsky, **Rear Adm. Richard E. Byrd, Robert M. Durham,** Durham Aircraft Service, **J. S. Kirkpatrick,** Magnesium Association, and **Robert Prescott,** Flying Tiger Line, Inc.

Alexander L. Anderson has been named Lockheed representative in the field of public information in New York and Washington. **Ann Ibsen** continues her Lockheed public information assignment in New York in association with Anderson.

John W. Hernlund was appointed Western Aircraft Sales Manager for the Cherry Rivet Division of Townsend Company. **Harold C. Kornman** succeeds Hernlund as head of the manufacturing operations at Cherry Rivet's Santa Ana (Calif.) plant.

George S. Trimble has been named to head Martin Aircraft Company's new advance design department and has been elected a vice president of the company.

George E. McKinley, Jr., is now Supervisor of the Instrument Shops at Dallas Aero Service, Dallas, Texas.

P. R. Heffren has been appointed Supervisor of Flight Service Personnel of Trans-Canada Air Lines, and **L. F. Fenton** has been named Passenger Service Supervisor.

Samuel O. Perry, Jr., has been named chief of missile design, Chance Vought Aircraft. **Max S. Simpson** has been appointed assistant controller and **Floyd E. Peavler** has been named internal audit supervisor of Chance Vought.

Dr. Shao-Wen Yuan has been promoted to the rank of research professor in the department of aeronautical engineering at Polytechnic Institute of Brooklyn.

Brig. Gen. Leighton I. Davis has been assigned to Holloman Air Development Center, Alamogordo, New Mexico, as commander. **Col. Donald Ostrander** replaces Brig. Gen. Davis as Director of Development at Headquarters, ARDC. **Brig. Gen. Marvin C. Demler** has been assigned to Headquarters, ARDC, as Assistant Deputy Commander for Technical Operations, and **Brig. Gen. Howell Estes** has been reassigned to Wright ARDC as Director of Weapon Systems Operation. **Col. Homer A. Boushey** has become deputy to Gen. Estes. **Col. Don D. Flickinger** is now Director of Research, Headquarters, ARDC., Baltimore.

Willis Player has been appointed Director of Public Relations for the Air Transport Association.

COMPANIES

Radio Technical Commission for Aeronautics has moved its Secretariat to T-5 Building at 16th Street and Constitution Avenue, N.W., which also houses the CAB and CAA.

Lockheed Aircraft Service, Inc., has established a domestic office for its affiliate, Lockheed Aircraft Service—Overseas, at Burbank, Calif. **William D. Hammond** has been named to head the new office.

Arma Corporation merger with its parent company, American Bosch Corp., has become effective. The single company is now named American Bosch Arma Corp.

AERO CALENDAR

Sept. 4-6—National Aircraft Show, Dayton, Ohio.

Sept. 7-12—Society of British Aircraft Constructors 1954 Flying Display, Farnborough, England.

Sept. 13-24—Instrument Society of America, International Instrument Congress and Clinic, Philadelphia.

Sept. 30-Oct. 1—Radio Technical Commission for Aeronautics fall assembly, Washington, D.C.

Oct. 4-6—Tenth Annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 5-7—Champion Spark Plug Co. Annual Aircraft Spark Plug and Ignition Conference, Secor Hotel, Toledo, Ohio.

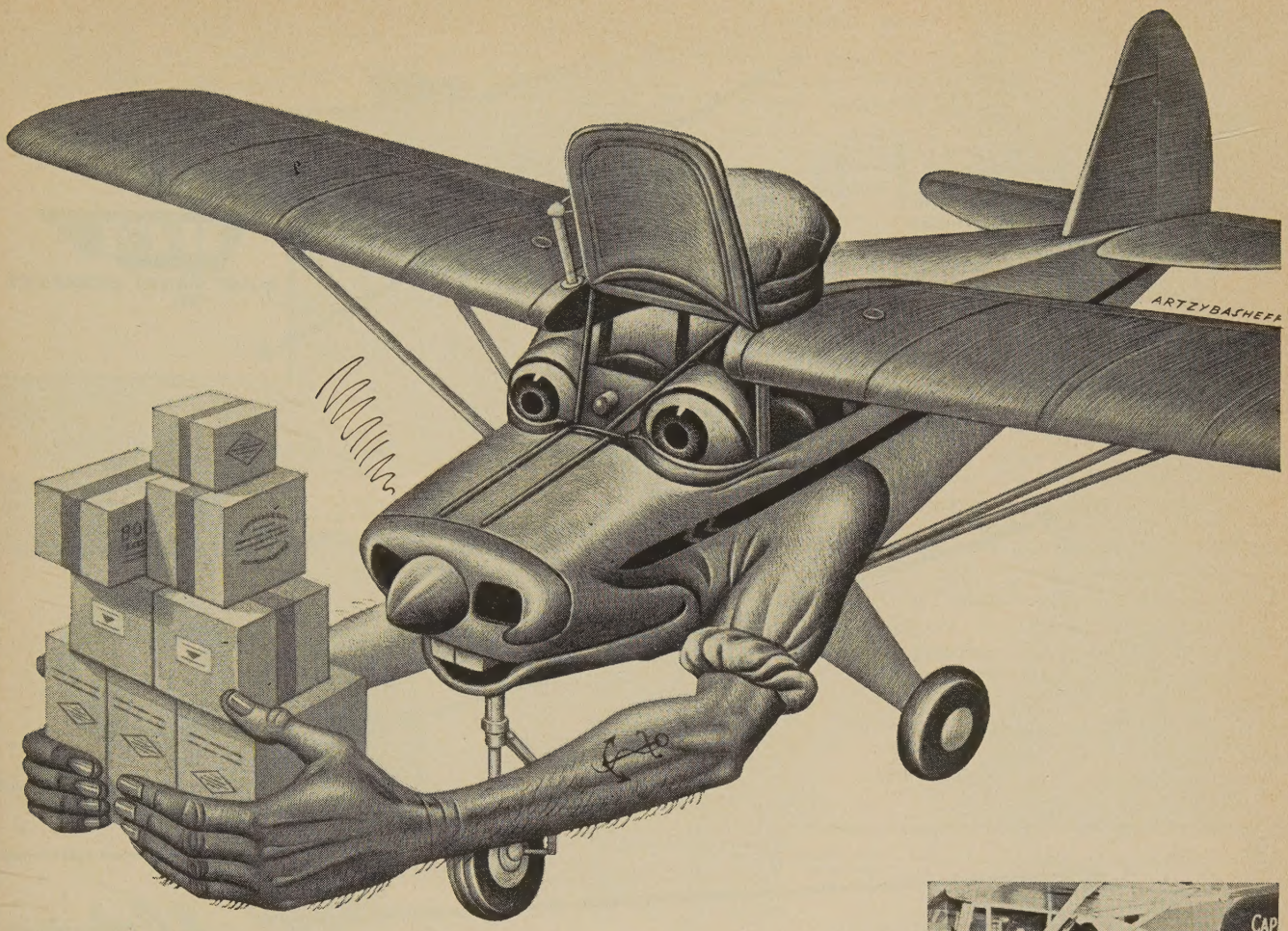
Oct. 5-9—Society of Automotive Engineers National Aeronautics Meeting. Hotel Statler, Los Angeles.

Oct. 17-22—International Union of Aviation Insurers annual general meeting, New York City.

Oct. 18-22—National Safety Council, Aeronautical Section, Conrad Hilton Hotel, Chicago.

Nov. 8-9—National Aviation Trades Association annual convention, Hotel Biltmore Terrace, Miami Beach, Fla.

Nov. 14-17—Aviation Distributors and Manufacturers Association Twelth Annual Meeting, Mayflower Hotel, Washington, D.C.



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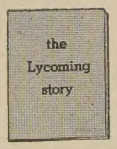
When deliveries are *Rush* with a capital "R" . . . today's progressive businessman turns to a small company plane that relieves him of dependence on the schedules of commercial air-freight systems.

Take the case of the Capital City Printing Plate Company of Des Moines, Iowa . . . operator of a Piper Tri-Pacer powered by Lycoming. Gene C. Meston, General Manager, says: "We could not maintain our production and sales level without the Tri-Pacer. The airplane and the pilot do the work of two trucks and three drivers. We save a lot of expense and keep our customers well satisfied."

Our own experience at Lycoming with the Tri-Pacer is a revelation in dollars and cents. It carries a 500-lb. payload at an operating cost of only 5.6¢ per mile . . . *less than the average cost of running an automobile!*

For the "air truck" in *your* future, test-fly a Piper . . . or one of the other leaders in this small-plane field that fly with dependable Lycoming air-cooled engines.

Off again to deliver the goods! Tom Vodenik, Capital City pilot, shown here, says: "We logged over 750 hours in the first eight months we flew this Tri-Pacer. The plane has had nothing but routine maintenance—it's ready to go every day!"



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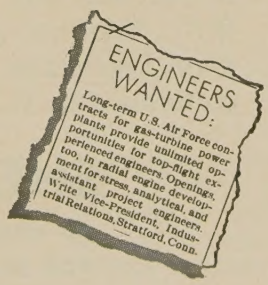

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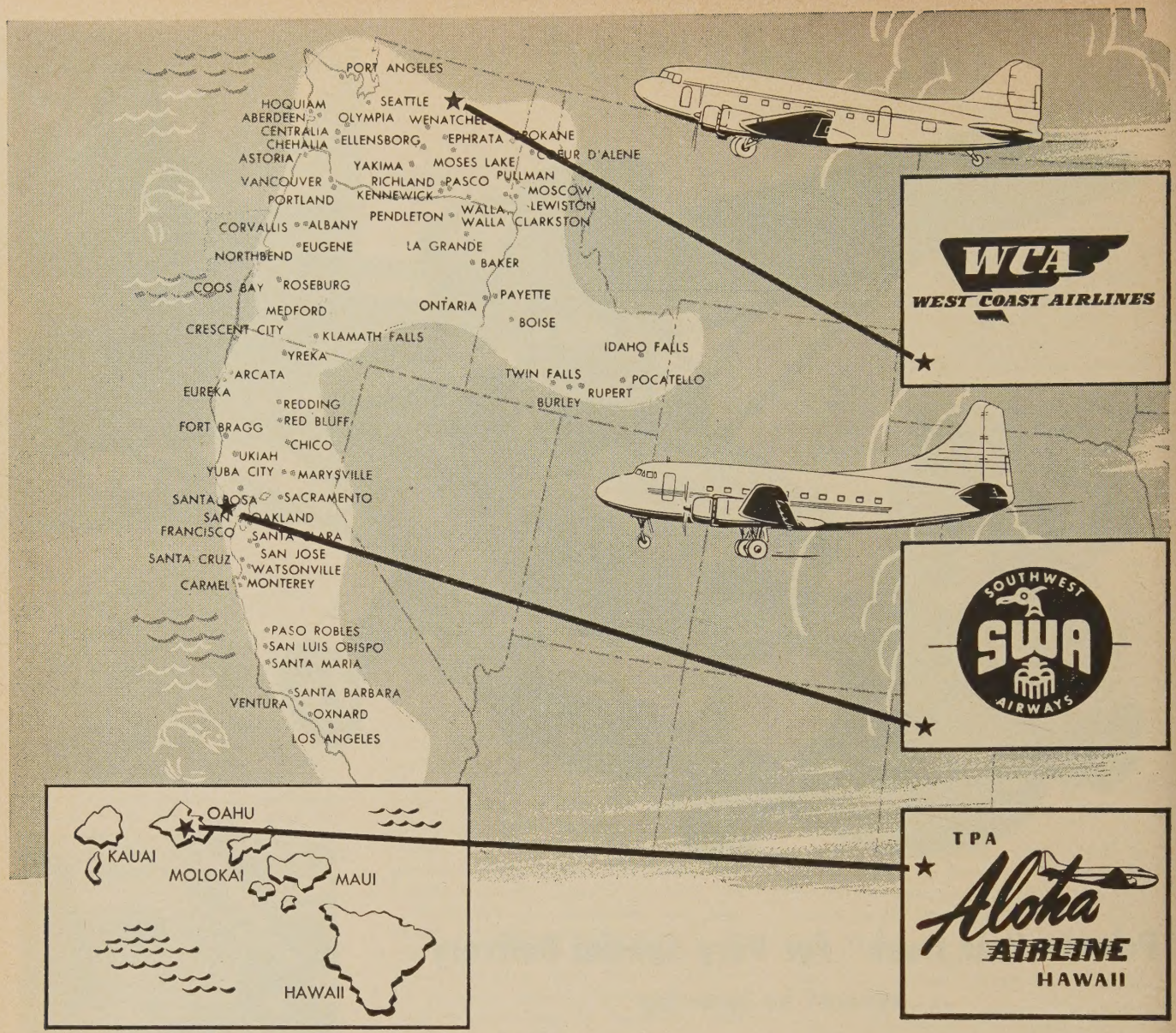

These Pacific Coast and Hawaiian Island airlines make over 800 takeoffs and landings every day . . .

all three get outstanding service with AEROSHELL OIL

THE ENGINES in local service airlines are subjected to the toughest kind of operation. Southwest Airways, West Coast Airlines and TPA Aloha Airline are good examples . . . they make over 800 landings and takeoffs daily.

Short hops require that the engines frequently alternate between full throttle and idle. This service calls for an oil that can *take it* . . . that can operate with the high lubrication efficiency that gives low engine wear. That's why so many local service lines certificated by C.A.B. depend upon AeroShell Oil.

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SHELL

by J. H. Achilich
Special Devices Center, ONR, USN

Instrument Integral Lighting

A report on studies and experiments by Special Devices Center of Office of Naval Research to increase aircraft instrument legibility

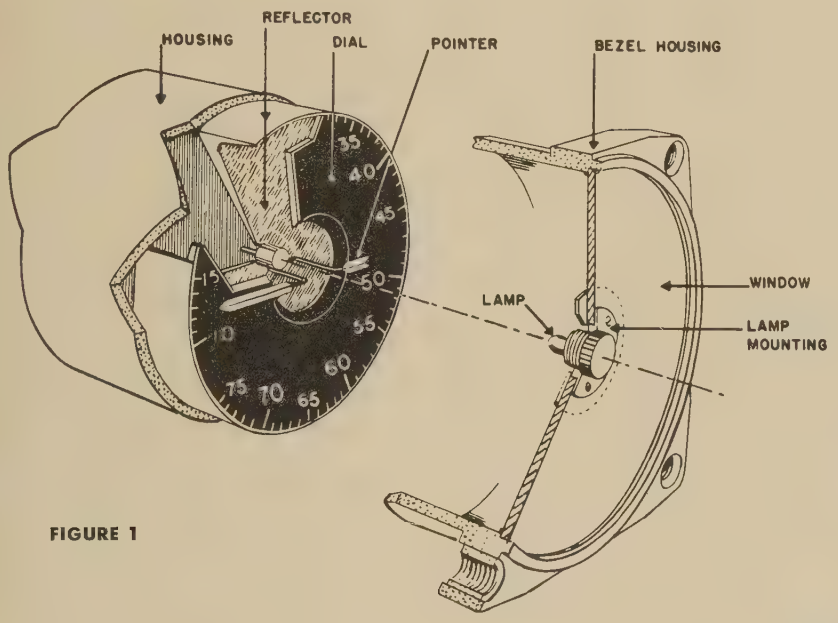


FIGURE 1

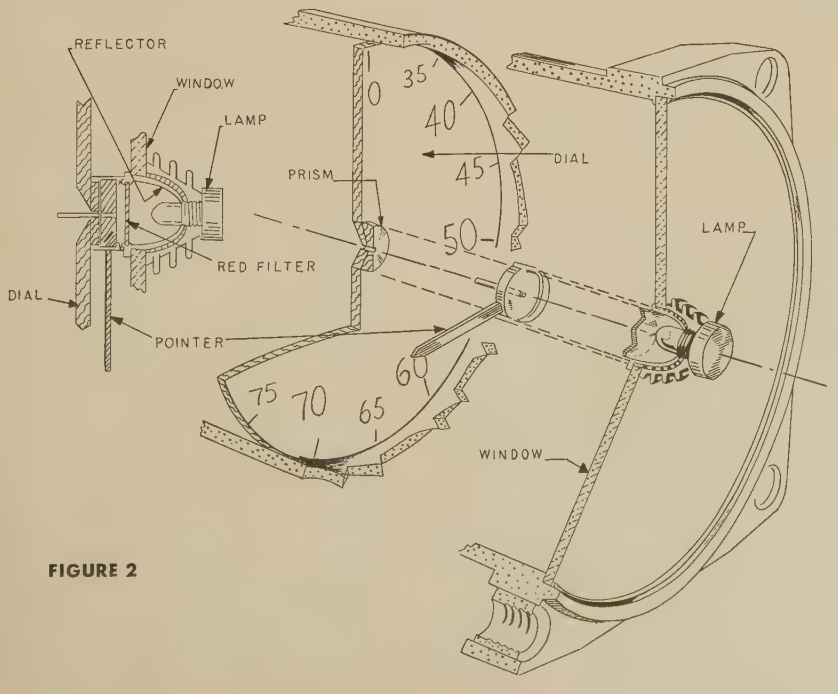


FIGURE 2

The Special Devices Center, a division of the Office of Naval Research, has been conducting studies through its Air Applications Equipment Branch on the problems of all-weather flight. To enable aviators to perform their assigned missions regardless of the weather, emphasis has been placed on instrument flight proficiency and All Weather Flight programs. To further this program, BuAer requested that the Special Devices Center be used to accomplish the study and design of functional cockpits, instrument panel lighting, instrument arrangement, and design of instrument displays. The instrument lighting that I will discuss here is one of several current developments.

A large number of systems and combinations of systems have been used in the past as an approach to the problem of instrument lighting. It is our firm belief that the major solution to the over-all problem of cockpit panel lighting is integral lighting of the individual instrument.

In discussing the general subject of instrument lighting, it is necessary to also consider the possibilities of instrument brightness. The intensity of illumination is the direct illumination on a surface from a uniform point source and is measured in foot candle units, whereas the brightness is measured in foot lamberts. Brightness is the product of the luminous reflectance of a surface and the intensity of illumination. That part of the incident light that is reflected by a surface is its reflectivity in foot lamberts.

From the Inverse square law we know that the illumination in foot candles varies inversely as the square of the distance from the light source. Also of interest is the fact that the night sky brightness varies from 10 to 20 micro-foot-lamberts for an overcast starlight condition, to 5,000

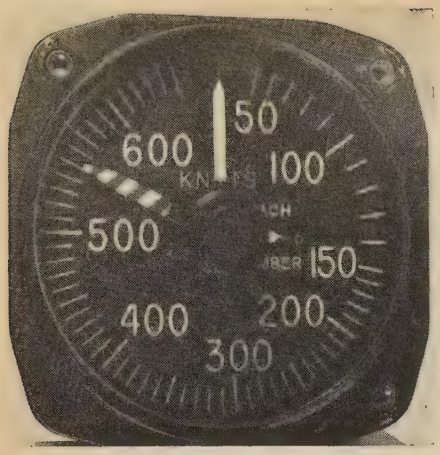


FIG. 3—*Airspeed indicator was modified to present original viewing configuration*

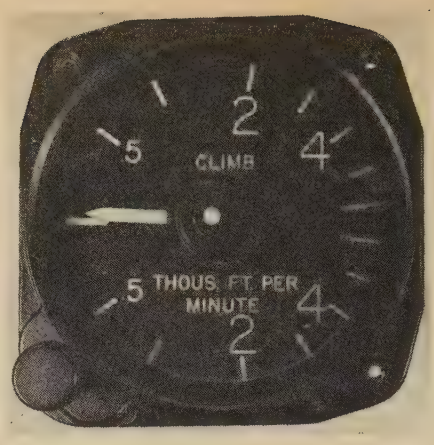


FIG. 4—*Rate-of-climb is typical center-pointer instrument with integral lighting*

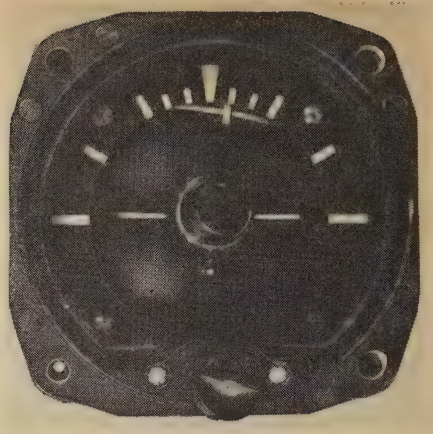


FIG. 5—*Gyro horizon is example of integral lighting of movable bar instrument*

to 20,000 micro-foot lamberts for a full moon condition. Taking the foregoing into consideration, for a complete dark-adapted condition, the optimum brightness value for instrument markings could be somewhat above .02 foot lamberts. It has been found that the accuracy of reading dial settings increases sharply in the .02 foot lamberts region; however, accuracy does not improve appreciably above this point by adding additional brightness up to 6 foot lamberts. This is considering a completely dark-adapted condition. Results of tests made in cooperation with a group of pilots indicated they preferred a brightness level for red floodlighting ranging from .003 to .084 foot lamberts and for indirect lighting from .0125 to .061 foot lamberts when flying under normal night conditions.

In reading transilluminated dials it has been found that the addition of red floodlighting increases the indicia brightness (reflecting) but reduces the contrast.

High-level red floodlighting should allow for legibility of instruments without transillumination when the pilot is not dark adapted or when exposed to intense light. The addition of red floodlighting of fixed low level (.044 foot candles) should prevent autokinetic (floating) effects and gives the pilot a degree of cockpit orientation.

For night cockpit illumination, red light has been universally used because of its preservation of the dark adaptation of the eye.

After examining many of the instrument-lighting systems available thus far, it was concluded that in order to obtain optimum conditions of lighting integrally with the instrument, the light source should be incorporated at the center of each instrument. This basic-type integral-lighting system was conceived and developed at the Special Devices Center, employing a light installation in the center of the instrument window with dials and pointers of translucent material.

The objectives of this central lighting system were:

1. Lighting installation to be part of each instrument.
2. Lamp to be accessible and replaceable from the front of the instrument.
3. Lighting distribution to be uniform and all information clearly visible.
4. No rework to the instrument activating mechanism to be necessary, thereby enabling present-type instruments to be modified to this lighting system.
5. Ability to present the instrument information at low levels of illumination, thereby achieving optimum dark adaptation.
6. Brightness level to be adjustable to provide adequate brightness for various conditions.
7. A minimum of light spill from the instrument into the cockpit.
8. A common system of lighting applicable to all instruments.

Lighting Development

The basic problem in the development of the integral lighting system was to illuminate the lamp at the center of the instrument window and then transfer this light to the pointer and dial without light spillage—the pointer and dial indication to be transilluminated only, in the majority of cases.

The first lighting possibility attempted was the mounting of an NAF 1207 instrument midget light assembly in a window of a standard single-pointer instrument. The original metal pointer and dial configuration was held intact. When lit, the light assembly produced extreme reflections and a "halo" effect on the dial.

The second step was the use of a T 1-1/4 bulb, special base instrument lamp mounted in the center of the window of a manifold pressure instrument. *Fig.* 1 shows an exploded view of this configuration. Wires were run to the bulb mounting to carry the current to the center of the instrument window. The original dial was replaced with one of translucent plastic. This plastic dial was composed of three layers bonded into one single sheet. The top layer is a milky white, and the bottom layer a transparent plastic. This plastic material or variations of it is available on the commercial market.

The dials were engraved through the black vinyl face into the matte white inner layer. This produced matte white numerals and indicia on a dull black background.

The metal pointer was of "U" configuration to allow the bulb to protrude into the center hole of the plastic dial and also enable the pointer to mount on the instrument handstaff pinion.

The third step was the use of the foregoing configuration with the addition of a metal dome attached to the metal "U" pointer, allowing the bulb to extend through it to light the dial. This presented good transillumination of the dial and eliminated the "halo" effect, but the pointer illumination was not bright enough. The domed pointer configuration also was too heavy and cumbersome for the instrument actuating mechanism.

The fourth step was a further development of the foregoing configuration. Until this stage in the development, wires were used to carry the current to the lamp assembly. Now a transparent conducting coat-

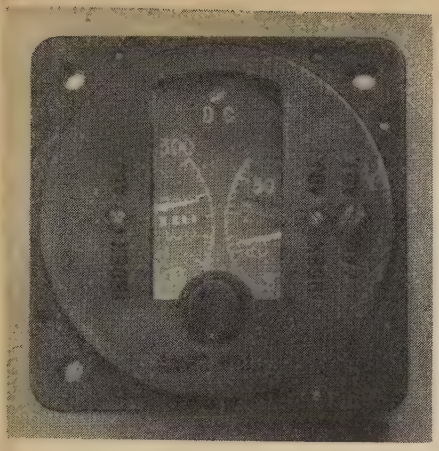


FIG. 6—*Dual voltammeter integral lighting required the use of a new cover plate*

ing on both sides of the window glass was used to provide electrical connection to the bulb mounting in the center of the window. An hermetically sealed plastic dome incorporating a red filter was added to the lamp mounting assembly and the entire unit sealed to the window glass. An acrylic transparent plastic pointer was overlayed on the metal pointer to allow for transillumination of the pointer, and light was bled from the lamp-mounting assembly into the plastic pointer. This did light the pointer, but with a minimum of brightness. The pointer assembly was then changed to a one-piece plastic type incorporating an integral light shield, and this configuration paved the way to the final pointer assembly.

At this stage, the possibilities of various type bulbs were explored. Lamp-mounting assemblies for T-1-3/4 midget flange base bulbs were designed to be incorporated in the center of the window glass. This mounting assembly enabled us to use the No. 327, (28-volt, .04 amp) No. 328 (6-volt, .20 amp) and No. 330 (14-volt, .08 amp) aircraft miniature lamps.

Another development was two window glasses with Nesa coating and silver concentric bus bars. One window incorporated a 3-volt lamp and a hermetically sealed housing. The other window contained a mounting for a T-1-3/4 midget flange base lamp.

Because of the limitations of size and the illumination possibilities, it was decided to concentrate on the use of the T-1-1/4 special base instrument lamp. This lamp is presently rated at 3 volts and 0.19 amps. In order to obtain greater flexibility, this bulb will be available at 6 volts.

All center-pointer instruments require a more or less similar pointer and basic window design. The rate-of-climb indicator being a typical center-pointer aircraft instrument, let us trace its integral lighting component parts.

Pointer Design

The original pointer of this instrument conforms to specification AND 10404-3. The "U" pointer configuration in the preceding development had shown its inapplicability to the lighting problem and definitely pointed to the necessity of a straight pointer design. The combination of a straight plastic pointer and metal light shield allows for the final pointer assembly, using an acrylic plastic pointer with a white and black underlay.

The body of the pointer assembly, which mounts the metal boss to attach to the handstaff pinion, is clear plastic with a laminated plastic or aluminum circular light shield surrounding it. The pointer can be imbedded in and cemented to the clear plastic body and so bevelled as to pick up the light passing through, or it can be made in one piece, with a prism cut in the body section, thus transilluminating the pointer. The pointer assembly is statically balanced by the addition of a weight on the circular shield opposite to the pointer.

Dial Design

As noted under "Lighting Development," the dials are translucent plastic. The dial background is dull black with the numerals and indicia a matte white. There are numerous methods of producing this facing on the plastic dial, and besides black and white vinyl facings, the dials can also be produced by photographic and other processes.

In conjunction with the dial, an aluminum reflector was designed to provide a means for backlighting. This reflector, of modified spherical section, allowed for the additional dispersal of light from the center of the instrument to the dial markings. Although lighting obtained with the reflector was improved, it was not due to case stack-up.

In most cases, the dial markings conform to those originally specified for the particular instrument. For optimum results, a stroke width-to-height ratio of between 1:6 to 1:8 should be used on the numerals and indicia of the dial.

The dials require at least 3/32 inch thickness. A center hole allows for pointer shaft clearance and a center-mounted prism bends the light rays 90° to transilluminate the dial. The center-mounted prism protrudes above the dial face to allow the pointer light shield to cover it, allowing no escape of light onto the dial. To increase the intensity of the transilluminated markings, the back and edge of the dial is mirrored with aluminum.

Window Design

The window glass is 5/64 inch thick polished plate glass with a center hole which allows for the lamp-mounting assembly. An electrical conducting transparent coating was applied to both sides of the glass and terminated in silver with gold overlay contact busses at the inner and outer diameter on both sides. The resistivity of the coating varies from 30 to 55 ohms between the concentric bus bars, per side. The outer surface of the glass is electrically ground. Many of you are familiar with the Nesa transparent electrically conductive coating as applied to aircraft windshields to accomplish de-icing and de-fogging. This Nesa coating is the conductor used on these instrument windows. The reflection of the window glass treated with the Nesa coating is slightly greater than the uncoated glass. However, this does not appear detrimental to the visibility of the instruments in the lighted or unlighted state.

Not only does the Nesa electrical conducting coating enable the bulb to be illuminated but also, because of its resistance, heat is created over the entire window area, thereby defogging the instruments, an important factor in high-altitude flight. The equilibrium temperature of the glass can be controlled by the resistance of the conductive coating. Instrument defogging by a similar method has been accomplished in certain instances.

Electrical Connection

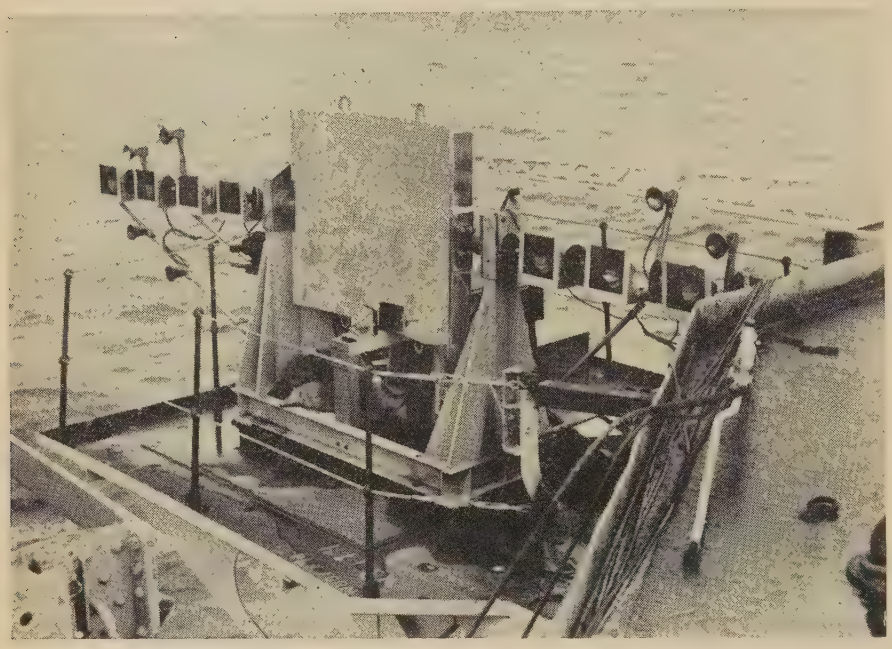
A standard instrument electrical connector is provided at the rear of each instrument case for power input. The plug contains a built-in resistor allowing for the adjustment required for the 3- or 6-volt bulb. The two-pin socket is permanently attached to the rear of the instrument case and the wire lead is run through a copper conduit mounted on the outside of the case assembly and terminating in the case flange. The lead wires terminate in a clip or ring contact assembly. The clip or ring contact picks up the bus bar on the inner side of the window glass, thus providing the electrical connection for the window assembly. Neoprene

(Continued on page 36)

MIRROR LANDING AID

With hand-signaling methods becoming inadequate for aircraft with high approach speeds, British develop a mirror sight aid for safely landing aircraft on carriers

by D. A. Smith



MIRROR *landing aid is four feet square and pivoted on a mount to permit angle variations. To give pilot datum, rows of red lights are mounted on each side of mirror*

In the battle for air-sea supremacy, necessity has really proved the mother of invention. With aircraft coming faster and bigger, and shipbuilding costs rising, it has been necessary for Britain's Admiralty and the Ministry of Supply to do some really basic thinking. The problem was how these fast aircraft of the future could be flown off and landed on aircraft carriers of reasonable size.

Three ideas have emerged into reality: the powerful steam catapult for launching aircraft, the "angled" or "canted" deck for providing aircraft with a clear landing path, and now the mirror sight landing aid for guiding aircraft to the flight deck at the optimum angle. Informed of all such matters, the United States Navy has been more than interested in the resulting techniques, and the angled deck was first seen on the U. S. Navy carrier, *Antietam*.

The steam catapult has been a long, slow development dating from war-time researches and is just now being put to use. But the story we are concerned with started in the summer of 1951, when Captain D. R. F. Cambell. then Deputy Chief Naval Representative at the Ministry of Supply, was devising the technique of the clear flight path which, angled at some 10° from the center line of the ship, permits the pilot to fly off again if he does not like it.

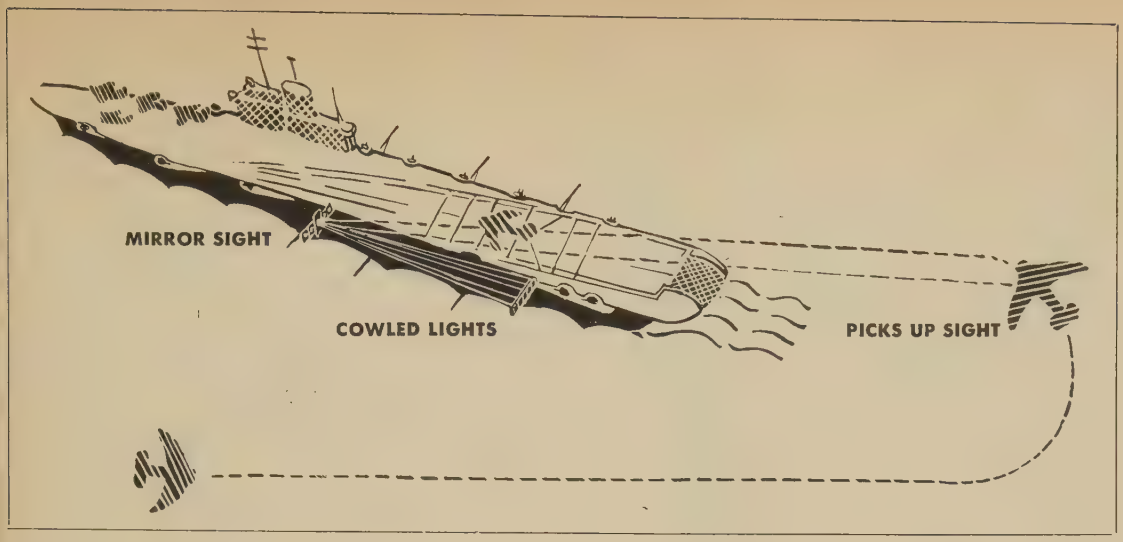
Cambell's assistant was a Commander (E) H. C. N. Goodhart, a Naval engineering specialist who had owned his own aircraft, driven an automobile in the Monte Carlo Rally, and is now Air Engineer Officer to the Naval Staff of the British Joint Services Mission, Washington. To Goodhart and his colleagues it had been apparent for some time that hand-signaling methods would ultimately become inadequate for landing aircraft of considerably increased approach speeds, and he had the hunch that the natural corollary to the angled deck would be an automatic robot signaling system employing mirrors.

It is said that to prove his point, he borrowed a lipstick and mirror from his chief's secretary. He proceeded to put blobs of lipstick halfway up each side of the mirror, placed it at a slight angle on the table and stood the lipstick in front of it. Finally, he asked the stenographer to keep the lipstick image in line with the red lipstick marks on the mirror while she moved her head forward. Her chin finally touched neatly down on to the desk and the first stage in the trials of the new landing aid was complete.

The Royal Aircraft Establishment at Farnborough exists for just such jobs as developing the new aid. Experiments with various mirrors and lights were advanced on a full scale by a team led by a young Cornish scientist, Mr. D. Lean.

Eventually, they produced a robot basically similar to the present more advanced prototype, which will almost certainly displace the Landing Signal Officer from the flight deck. A mirror, which started some 8 feet in height and is now about 4 feet square, remains the vital component. It is pivoted on a mount which permits variation of angle from the vertical, or more specifically from the horizontal line between the mirror itself and the horizon. Moreover, the selected angle can be kept constant by means of a gyro mechanism even when the carrier is pitching in a seaway. To gunnery experts whose help was solicited, this mechanism was a fairly simple thing to devise with existing components.

To give a datum, rows of red lights



are mounted level with the central pivot at each side of the mirror. Some 150 feet astern of the device, which faces aft, is another row of cowled lights which focus a single blob of light on to the mirror. When the pilot flies towards the carrier, he keeps this blob in line with the red datum lights.

If the aircraft is too high, the blob appears to rise towards the top of the mirror; if too low, it drops. The vertical angle at which the mirror is set is varied slightly according to the height of the pilot's position above the bottom of his undercarriage, and so the touching down on the deck can be made with great precision.

The Final Trials

It became apparent that, if the pilot's attention were not to be distracted from the blob, some means of remote reading of the airspeed indicator in his aircraft would be necessary in order that the speed as well as the angle of approach be kept at the optimum. Therefore, a small metal box with red, green and yellow flashing lights was coupled to the airspeed indicator, and these were arranged so that they reflected in a special panel on the windshield. A flashing red is the warning for a speed too near the stalling point, a slow flashing red indicates a somewhat better but insufficient speed, while a slow green is the signal for the correct speed. On the fast side, a slow amber gives way to a fast amber flash.

The first crude sight was improvised from easily obtainable material, the mirror being made from a flat sheet of metal screwed to a suitable wooden frame. After tests with it on the runway at Farnborough, it was installed on *H.M.S. Illustrious* for trials in October, 1952. Lieutenant Commander T. G. Innes, and another Naval test pilot made the first landings with its aid.

Prior to actual landings there was an "approach only" series of trials designed to find out whether, in fact, the reaction between the batsman and pilot was too slow for handling the aircraft of the future. Existing aircraft were flown over the deck at approach speeds equal to those of the fast jet aircraft then on the drawing board and in various stages of development. They did not land, of course. It was sufficient to obtain detailed reports on the human reactions involved.

Then followed the first series of landings with the aid of the device at the normal approach speeds of the day. Ultimately, it was established to the satisfaction of all concerned that hand signaling was doomed and that the new aid was not merely a luxury but a necessity.

Foul-Weather Tests

Several suggestions for improvement were made and a mirror of better optical properties was produced for trial in June, 1953. For this series the old war-time veteran carrier, *H.M.S. Indomitable*, then doing duty as a trials carrier, was chosen. The mirror was mounted to starboard some 200 feet from the round-down. Representatives from the Commonwealth and the United States Navy watched a *Sea Vampire* do a series of landings. At the end of the first series it was decided to halve the height of the 8-foot mirror by blanking off the top and bottom. This resulted in greater uniformity in hooking on, the actual arresting wire hooked depending upon the pitching movement of the ship.

It was established that the reduction in the height of the mirror did not make it difficult to keep the blob on the mirror, as had at first been supposed. It was also found that the light signals could be seen through smoke with greater clarity than a batsman's signals and that it was possible to land, though not so comfortably, with the gyro mechanism thrown out of gear. A series of foul-weather landings, started as soon as the weather was rough enough, proved successful.

In November, 1953, further trials took place on board the *H.M.S. Illustrious*. These were on a more ambitious scale.

By this time, guided by the fruits

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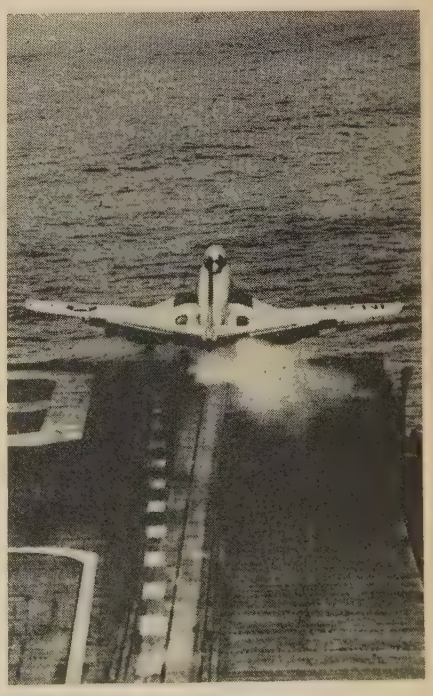
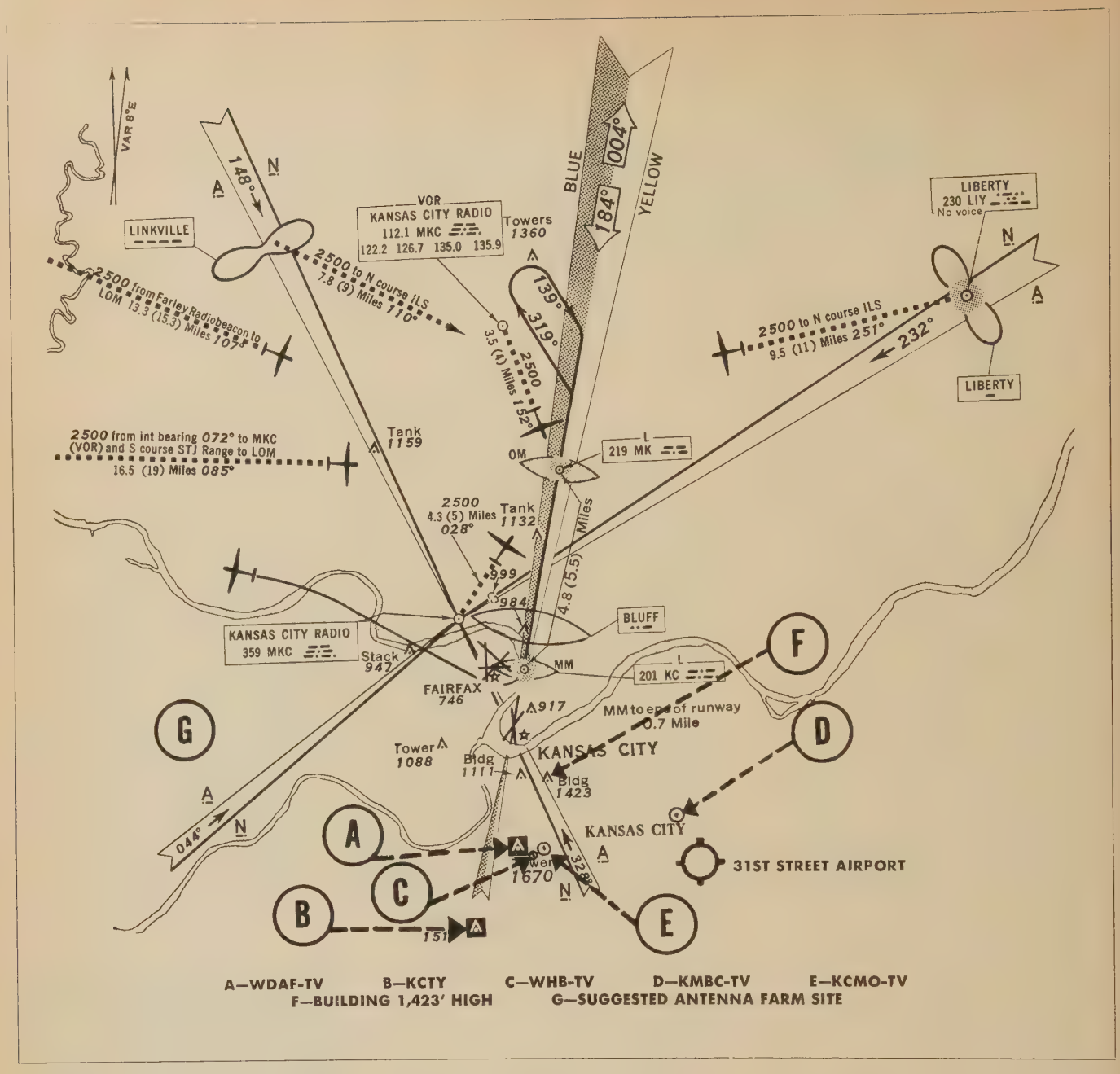


STEAM CATAPULT *also was British development. Here, a twin-jet F2H-3 is launched*



the danger of TV TOWERS

by Swanee Taylor

There can be no doubt about it, the pox of television transmitters now dotting the face of our map has become a deadly menace to air navigation. Moreover, with this particular peril new towers are not only being built taller and taller, but closer and closer to long-established aerial rights-of-way. Indeed, air travel today is faced with about as serious a problem it has had since Sir Isaac Newton found out about gravity. And since video, like gravity, is here to stay, public sentiment indicates the time has come for the TV industry, Aviation and the Government to drop their tedius "study" of the problem and apply some of our vaunted can-do talent to arrive at a solution. Here is how the matter stands today:

As of this writing there are some 360 TV spires already in existence, each one reaching anywhere from 500 to 1400 feet into the navigable airspace. Most of these, the smaller ones, are located in the densely populated East. However, thanks to the micro-wave relay, telecasting has gone cross-country in a big way with another 251 of these self-camouflaging pinnacles currently being rushed to completion—70 of which will top 1,000 feet. Furthermore, pending before the Federal Communications Commission in Washington, are close to 800 more applications for permission to build and operate TV transmitters. (Lest we get the screaming meemies, we won't even think about the harvest of king-size *receiving* aerials that have started sprouting in out-of-way places in the land).

Thus, there is in prospect roughly 1500 steel towers, all tall enough

for their tops to be shrouded in the overcast whenever local ceilings drop to less than 500 feet. Most of these structures either are or will be located near metropolitan areas where the air traffic saturation point already is causing grave apprehension. But the truly appalling side of the situation is that here, after two years of fiddle-faddle, nothing of a remedial nature has been undertaken. Not a thing, that is, save to give gloomy recognition to the fact that the towers constitute a hazard and that somebody had better dream up a way to reduce it.

Should proof be needed that the TV-tower menace has crossed over into the realm of tragic reality, substantiating evidence may be found in last year's record of aircraft-tower collisions. Therein it will be learned that in 1953 a total of four airplanes met with this type of disaster. Three of the hapless four smashed against television installations, (the other hit a power-line tower), with two out of the three coming to grief in the cob-webby tangle of guy wires supporting the structures.

In justice to the dead pilots it is only fair to report that none of them were out joy-hopping around in weather. All were expert aviators, one was flying an airliner, and all but one were on instruments when the inadequately marked towers loomed like lightning in the murk. The term "inadequately marked" is generally agreed upon by experienced airmen and there is unanimity of opinion that had there been sufficient warning—even three short seconds of grace—those splendid men could have dodged away and gone on living.

These widely held beliefs touched off a spontaneous reaction throughout the aviation world, which was especially violent among those in the operations phases of the industry. Air men and women feel doubly justified in demanding a set of sharp-toothed marking regulations which will at least reduce the tower terror to a reasonable minimum. This is understandable inasmuch as they are the ones who will be called upon to do the dying for the sake of soap operas and other ethereal drolleries. As to be expected, they are up in arms over what is termed an utterly needless threat to their lives.

Organizations Campaign

Foremost in the fight to bring about a remedy are the Air Line Pilot's Association, the Aircraft Owners & Pilots Association, the National Aviation Trades Association, and the National Business Aircraft Association. Practically everyone who owns or flies an aircraft in these United States belongs to one or more of these organizations. And, it might be remarked in passing, that the memberships are heavily laced with persons who are cast along lines of rugged individualism and who can fling critical brickbats with remarkable speed and accuracy.

There are other aeronautical groups just as active in the fight but, being more or less of a lobbying character, they preforce must confine their strategy to what is known as boring-from-within. Ordinarily, this type of warfare also brings about excellent results. But in the present case neither brand of tactics has produced anything resembling victory for air power. The brickbats either have fallen wide of the mark or bounced harmlessly away, while boring weapons have been worn down to nubs against the case-hardened shell of opposition.

Working Group Established

Perhaps it would be better to say that the present campaign is a resurgence of a two-year-old cry for protection against the towers. As long ago as April 1952, the several parties interested in the matter—Aviation, TV and Government—all sat down together in a "Working Group" to draw up a satisfactory *visual* marking system for the stratospheric transmitters. The word "visual" is stressed because practically the entire Working Group, including several who should have known better, pooh-poohed the thought that any pilot capable of flying on instruments would ever come close to a transmitter tower.

As it turned out, the happy concordance was a snare and delusion as far as the aeronautical participants were concerned. True enough, when the Group got up from the table, all of the expert aviation opinion was incorporated in the report, carrying with it a tacit understanding that the recommendations would be a part of the forthcoming regulations.

Yet when the new Obstruction Marking and Lighting Manual finally came out, in November 1953, little or nothing new was included in these specifications. The plea for placing lights on guy wires, for example, was dismissed as being too expensive and too bothersome, maintainance-wise. So the marking situation remains basically the same as it was when originally set up in Part 17 of the Federal Radio Commission Rules in 1934. It was 20 long years ago when that body recognized the perilous potentials to be found in unmarked spires sticking up here and there everywhere, and with commendable promptness, they decreed that any radio transmitter over 500 feet tall must be regarded as an aeronautical hazard. This was back in the days when there was hardly an antenna anywhere that reached into the overcast, save in virtually zero-zero weather. Even so, the Radio Commission was extremely wary about granting broadcasting licenses and equally diligent in seeing to it that the tower rules were enforced to the letter.

Then, two years later in 1936, came the Air Commerce Act which placed this responsibility in the hands of the CAA. This law specifically provides that the Aeronautics bureaus keep an eye on the transmission towers and take whatever steps necessary to keep the menace at a low minimum. But since radio broadcasting depends on kilowatt power rather than high elevation for distance, there were only a few transmitters that rose above 500 feet; hence there was not much policing to be done and the enforcement apparatus became becalmed.

With the advent of video with its alpine towers, a suggestion was made that the whole matter be placed back in the hands of the FCC. The thought held here was that, although the communications agency may not be too well versed in aeronautics, there had been precious few tower collisions during the time they held the reins. (If memory serves, only one or two aircraft ever flew into a radio transmitter).

Unfortunately, such simple solution is no longer possible, inasmuch as only last year the FCC amended Part 17 of the Rules so as to comply with the previously mentioned Obstruction Marking Manual. All of this leaves us just about where we were when they first started marking towers back in the early '30's.

One would think, what with the technological advances made in the years since World War II, that some method would have been devised to prevent a relatively simple engineering question from reaching the problem stage. There are too many marvels of electronic wizardry in everyday use for us to be asked to believe otherwise. If, for instance, engineers can develop a highway traffic control system which changes all lights to red in the path of speeding ambulances, fire trucks and police cars, (midget UHF senders and receivers do the trick), why can't some equally bright mind come up with a gadget that will warn the

(Continued on page 32)

SKYWAYS
FLIGHT OPERATIONS
ROUND TABLE

SEPTEMBER 1954 *Wings Club, New York*

Problems in Airport Development

Pros and cons on proposed new criteria for Federal aid to airports and their effects, if adopted, on the growth of aviation in the U. S.

ROUND TABLE *participants were (standing, left to right) Wray Clark, Howard Dubanowich, Sam Freeman, Joseph Johnson, Louis Inwood and Robert Kerr. Seated at table (left to right) are John Geisse, William Strohmeier, John Leh, Wilfred M. Post, Jr., Moderator Fred M. Glass, W. E. Cullinan, Jr., Carl A. Benscoter, J. G. Bennett, Assist. to Under Secy. for Transportation, who served as an observer, Melvin A. Brenner, also Assist. to Under Secy. for Transportation, and Brig. Gen. Milton Arnold*

Moderator Fred M. Glass (*Dir., Aviation Dept., Port of New York Authority*): "Airport development is the topic under discussion today, and in line with this subject we might ask, 'Is our airport development program keeping pace with the over-all progress of aviation?'

"Equally important, 'Will the proposed new criteria for airports and Federal aid to airports, promulgated and backed by the Administration, aid or retard the growth of aviation in general?'

"*With that background and confining ourselves to this subject, I'd like to call on a representative of the Office of the Under Secretary of Commerce for Transportation for a statement of Administration policy with respect to Federal participation in the development of airports and the reasons which motivated adoption of that policy. Mr. Brenner?*"

Melvin A. Brenner (*Office of the Under Secretary of Commerce for Transportation*): "It should be emphasized at the start that this discussion is being held in June, at a time when legislative proposals affecting the airport program are pending before Congress, as is the Department's appropriation request for this program for fiscal year 1955. Since this discussion will not be published until September, it should be clearly understood that developments may occur prior to that time which would affect any comments made at this meeting. Subject to this qualification, I shall be happy to discuss various factors which have

"AVERAGE *allocation to Class 1, 2 and 3 airports is $25,000," said Mr. Geisse*

influenced the decisions reached by officials of the Department of Commerce with regard to this program.

"The Department of Commerce undertook a general review of the airport program last year, feeling that such a review was desirable in the light of experience gained with the program since the Federal Airport Act was passed in 1946. In 1946 we were just moving into the post-war period and the character of post-war aviation and the need for airports could not be too clearly foreseen. Moreover, the fiscal outlook then facing the Federal Government was considerably different than that which has since developed. The Department asked its Transportation Council to review the program and an Airport Panel was appointed for that purpose.

"Based on the report of the Panel and the Department's own evaluation, the Department has concluded that continued Federal aid for airports is required at the present time. It also has concluded that certain adjustments in the program are needed. Funds have been requested to reactivate the program in the fiscal year 1955, and that request is now pending before Congress. The Department has recommended legislation to amend the Federal Airport Act in certain respects.

"A few years ago the CAA developed certain objective criteria for determining eligibility for Federal aid. The recent reappraisal has adopted the general approach previously followed, but has made the criteria more selective. The Department has announced the criteria which are now contemplated determining Federal aid participation in individual airports. They involve a level of aeronautical activity represented by

ROUND TABLE PARTICIPANTS

FRED M. GLASS, Director of Aviation for the Port of New York Authority, served as Moderator. He began his aviation career as Assist. Gen. Counsel of CAB in 1938.

LOUIS R. INWOOD has been Director of Aviation, Philadelphia, since 1953. An ex-president of Airport Operators Council, he is now a director.

SAMUEL FREEMAN, Eastern Vice Pres., of National Aviation Trades Assn., helped organize Somerset Air Service (N. J.); is dir. Flying Farmers.

W. E. CULLINAN, JR., Chief, Airports Div., CAA, graduated MIT in '30. He joined CAA in 1940 after spending 10 years in public works construction.

C. A. BENSCOTER joined Mohawk Airlines in '46, qualified as captain; was elected Vice Pres.-Operations in 1951. He was in the Navy during war.

BRIG. GEN. MILTON W. ARNOLD, USAF-R, has been active pilot since '31. During war, he held important operational responsibilities in 8th AF.

JOSEPH W. JOHNSON, Secy., Airport Use Panel, Air Coordinating Committee, is civil engineer. He spent 11 years with the CAA in airport engineering.

MELVIN A. BRENNER was transportation analyst with Budget Bureau prior to becoming Air Program Coordinator, Office of Under Secy. of Commerce.

ROBERT KERR, JR., Director-Properties & Facilities for American Airlines, spent 25 years as Construction Engineer before joining American in 1943.

JOHN H. LEH, a licensed pilot since '28, helped found Allentown-Bethlehem-Easton Airport; has been member of Pa. Aeronautics Commission since 1944.

WILFRED M. POST, JR., has been pilot since '33. Graduate of Parks Air College, he has been Mgr. of Allentown-Bethlehem-Easton Airport for 17 years.

WRAY CLARK began glider flying in '28; took up power-plane flying in mid-30's. For past eight years, he has been a pilot for Great Lakes Pipe Line Co.

WM. D. STROHMEIER, a licensed pilot and active in aviation since '36, helped organize the Private Flying Div. of National Aeronautics Assn. in 1939.

JOHN H. GEISSE, former CAA engineer, did much of development work on cross-wind landing gear; is now Pres., Geiss-Gears, Inc., specializing in gears.

HOWARD DUBANOWICH, Chief Pilot-Sales Engineer for Red Devil Tools, was with 8th Air Force during WW II, then flew MATS' C-54's in Pacific.

"JOINT *use of airline gates would be helpful," H. Dubanowich (left) said*

"PHILADELPHIA *permits unloading directly at passenger terminal gates for any corporate plane," said Louis Inwood, seated between Mr. Glass and Mr. Kerr*

"SHORT-HAUL TRAFFIC *is what we want to develop," reported Brig. Gen. Arnold (right), "Today, 80% is long haul; short-haul potential is 50 times that"*

3,000 airline passengers per year, or 30 based aircraft, or some combination of the two factors which would represent roughly equivalent activity.

"In developing these criteria, the over-riding consideration has been that the airport program—particularly one at the level dictated by the present fiscal situation—should be geared to the requirements of the broad national interest. It was felt that the best way of gauging the degree of national interest in any given airport was by some measurement of the level of aeronautical activity. The Airport Panel had so concluded and recommended immediate development of criteria using such measurements. The Department has done so and believes that, with this type of criteria as the basis for focusing the program, the maximum national benefit can be obtained from the amount of money provided for the program."

Fred Glass: "*Mr. Brenner, in applying the criteria you have stated, approximately how many airports in the U. S. would be eligible for participation?*"

Mel Brenner: "According to the best available information, approximately 760 airports meet the criteria. In the application of these criteria, as in any such criteria, it will be necessary to take into account special modifying factors. There will be cases where these particular measurements will not fully reflect the importance of improving a given airport, and in such cases airports will be included even though they don't meet these precise criteria. It is not possible to say at this time how many will be covered in that way."

Fred Glass: "*Are any of our participants of the opinion that the application of this policy will not be covered in that way.*"

William D. Strohmeier (*Utility Airplane Council, AIA*): "It seems to me that this policy is quite discriminatory. Any airport that has airline service and is already serving 3,000 passengers has reached a relatively satisfactory stage of development. But first, are we talking about terminal facilities?"

Mel Brenner: "One of the specific recommendations is that terminal buildings be excluded, so that aid would be concentrated primarily on runways and other facilities most directly related to safety and to defense needs."

William Strohmeier: "The airports that need help are those which are not yet ready for airline service. We don't want to have all the money for airports not served by airlines, but a representative percentage of fields not served by airlines should get some aid.

"I was in Newport, N. H., last week where they have a 2,000-foot paved runway. The operator asked me: 'How did you like our $5600 runway?' I said it was very good. Everyone on the field had joined forces and, for $5600, put in a 2,000-foot runway which gave them an all-season airport. There is need for more of those fields all over the country to serve the much larger fleet of business aircraft—much larger, that is, than the relatively few airlines serving the bigger cities. We don't want all the money by any means, but we do feel that the criteria of 3,000 passengers or 30 based airplanes is very discriminatory. That leaves out the vast majority of airspace users."

Samuel Freeman (*National Aviation Trades Assn.*): "I second Mr. Strohmeier's statement and want to point out that these criteria leave out our Classes 1 & 2 airports, thereby keeping them from any Federal aid. These airports are important in our air taxi work, and they are going to be more important if the present criteria for the local service airlines is followed up along the lines of subsidies to some of the feeder operators. This will tend to broaden the air taxi picture which receives no subsidy but which helps the airlines in some of these smaller communities. We need these facilities. The airlines occasionally forget that the smaller airports, those at the grass roots level, frequently are the source of pilot material, mechanics, and passengers.

"At the present time, the proposed program seems to be unbalanced. All the aid goes to Classes 3, 4 and 5 airports and the smaller fields are automatically cut out of any Federal aid. It indicates that a large amount of money is going to be spent in expanding existing airline fields and in extending runways to take care of the faster and bigger airplanes that continually seem to require longer and longer runways. We feel the new criteria should give Classes 1 and 2 airports some consideration."

Howard Dubanowich (*Chief Pilot, Red Devil Tools*): "Business flying has increased tremendously since the war years and it is continuing to expand. If only the airports mentioned in your various recommendations will benefit by Federal aid, I'd like to know what's going to happen to the airports being used by business aircraft? We have to show a safe operation, an economical one and a time-saving one for the personnel we fly. But what's going to happen to the airports we use? Every field that has a tower has grown tremendously. Let's look at the statistics of the top 25. Speaking of airline traffic alone on these fields, it's grown considerably in 1953 over 1952. Yet in the over-all ratio it dropped in percentage in 1952. Where in 1952 it was 50.2% of all airplane traffic, in 1953 it was 46.9%. This is further indication of the growth of airplane travel other than that of the scheduled airlines.

"There are generally two reasons why we visit those top 25 airports. One, of course, is to take our company personnel to the town served by the airport, and the other is to deplane these passengers so they can

(Continued on page 40)

Performance PITFALLS

from the Files of the Flight Safety Foundation

by Jerome Lederer and Robert Osborn

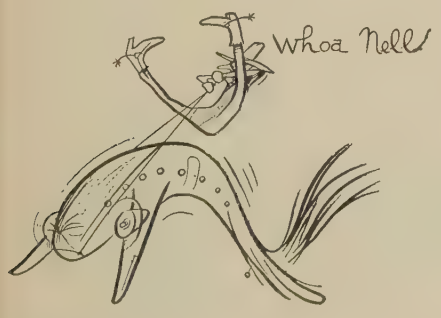
THE BOSS NEEDS OXYGEN

In corporation and privately owned aircraft, usually unpressurized, persons can be made much more comfortable and have a better chance of arriving at their destination with less flight fatigue if supplied with supplementary oxygen during a considerable portion of the trip.

Executives in corporation-owned aircraft using supplementary oxygen will arrive at destination refreshed and unimpaired by the depressing aftereffects of oxygen want, often occuring with some subjects even at altitudes of 5,000 feet. Pilot's normally keen reactions, judgment and vision can be impaired sufficiently, if an emergency arises while lacking oxygen, to turn an incident into an accident.

Pilots who feel that oxygen is for the other fellow may be inviting an accident. The effects can be cumulative. Deterioration in night vision has been observed at altitudes as low as 5,000 feet.

When flight personnel are tired after a long trip, we recommend that they use oxygen as they approach their destination. This is especially desirable and helpful on night approaches.



ROUGH RIDE

In preflight planning and from the available forecast, a regularly scheduled air carrier flight proceeding via Erie-Detroit, last summer, expected to encounter rather severe frontal weather conditions in the vicinity of Battle Creek, Michigan. Due to the intensity of traffic this flight, although desiring a much lower altitude, was cleared to cruise at 12,000 feet—usually a most undesirable altitude for thunderstorm navigation. While proceeding, the flight periodically requested lower altitudes. Finally, it was cleared to descend to, and cruise at, 10,000 feet. This clearance was obtained shortly before the flight passed over Windsor, Ontario, Canada. An immediate descent was made to the 10,000-foot level. The flight had for some time been operating on and off instruments.

Front Moved Rapidly

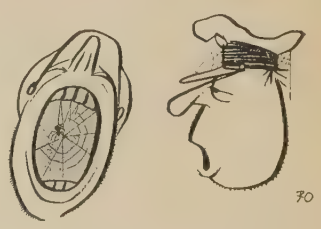
From radio reporting of other aircraft, it appeared that the frontal condition was moving somewhat more rapidly than had been forecast. However, this flight, based on best available information, was then anticipating passage through the front west of Detroit. Cabin attendants had been advised to expect turbulence and all passengers were wearing seat belts. Turbulence increased somewhat as the aircraft reached 10,000 feet just east of Windsor; it was slowed down to 'rough-air' speed of 175—180 mph IAS. Approximately over the Windsor range extreme turbulence was encountered for about 10 minutes, followed by 30 minutes of moderate turbulence. In debriefing this flight the Captain reported, "Encountered squall line, high-level type, in the vicinity of Windsor. Was not expecting this line until well west of Detroit."

Appearance Deceptive

The visual appearance of clouds proved false obviously as this storm area contained a severe squall line. Three or four very severe gusts were encountered, associated with the usual heavy rain and lightning, but no hail. Upon request of Detroit ATC, the flight was authorized, because of extreme turbulence, to descend on a northerly heading to 4,000 feet and was cleared to the east leg of Salem range via Red 63. Fortunately, no passenger or crew member was injured; however, the turbulence caused all loose cabin objects to be thrown around, making the cabin quite untidy thereafter. Upon the arrival of the flight at Chicago, a turbulence inspection was performed. The upper wing skin was found wrinkled near #2 and #3 alternate fuel tank access doors. In addition, numerous rivets were found loose. The aircraft had to be grounded at Chicago for necessary repairs.

DAWN YAWN

Many pilots on night flights feel an irresistable desire to sleep as dawn approaches, regardless of previous and sufficient rest. One airline has studied this problem and recommends:



1. Try to 'schedule' 30 minutes of sleep prior to the critical time.
2. Get up—walk to the back of the cabin.
3. Douse face with cold water.
4. Drink cold water.
5. Drink a cup of black tea—not coffee. Tea contains more caffein than coffee, but does not leave a coffee hangover.

COLLISION HAZARD

When manufacturers demonstrate their new developments, the pilot and the observer often are so intent on watching the gadgets that they forget about the other traffic. Such flights are frequently made in and over congested areas. The implications are obvious. *Suggestion*: Carry a third crew member to guard against mid-air collisions.

SKYWAYS FOR BUSINESS

NEWS NOTES FOR PILOTS, PLANE OWNERS OPERATING AIRCRAFT IN THE INTEREST OF BUSINESS

AERO COMMANDER 560, *featuring a new "swept tail," is the first of the light Twins built in the U. S. to use the new Hartzell three-bladed propellers offering smoother operations*

Hartzell Develops Three-Bladed Propeller for Aero Commander

Bethany, Okla. The Aero *Commander* 560 is the first light twin in this country to use the new Hartzell three-bladed propeller. Developed by Hartzell in cooperation with Aero Design & Engineering Co., this new prop has resulted in considerable improvement in cabin quietness and in smoother engine-propeller operation.

Engineering tests have revealed an increase in the quietness within the *Commander's* cabin of some 7 to 10 decibels. Sound meter readings also showed a more uniform sound level.

The new prop is 6 inches shorter than the two-bladed model used heretofore on *Commanders* and results in increased clearance between the prop tips and the fuselage as well as decreased prop-tip velocities. These, coupled with the fact that the total propeller mass has been divided into three equal parts, are responsible to a considerable extent for the smoother and more quiet airplane operation.

The new Hartzell is a hydro-selective, constant speed prop designed to be completely full feathering for increased safety and performance under single-engine operation. Feathering is accomplished by the use of a spring mechanism and unfeathering is by use of engine oil pressure.

The propeller is presently in full production and is available as optional equipment on the Aero *Commander* 560.

New Cowl Mounting Cushion Developed for Twin Beech

Defiance, Ohio. A new cowl mounting cushion called FLEX-WICH has been developed for the Twin Beech by Zelair Corp. Molded from a flexible rubber material, the FLEX-WICH forms a flexible sandwich between the engine cowl support brackets and the cylinder cowling support brackets. Replacing the hard phenolic blocks originally used on the D-18's, the new cowl mounting cushion dampens cowl vibration and permits the assembly to actually float on a resilient cushion. Wear, therefore, is virtually eliminated, and cracked cowls, popped rivets or breakage of other parts of the engine cowl mounting assembly are greatly reduced.

According to officials of Zelair, two hours is required for the initial installation of the FLEX-WICH's but the set should last for hundreds of service hours. Should later replacement be necessary, the FLEX-WICH's can be changed in 5 minutes, exclusive of the time required for removing and replacing the cowl.

CAA Issues "No Objection" Letter to Use of Spotoil

Washington, D. C. The Civil Aeronautics Administration's Powerplant branch has issued a letter of "no objection" to the use of Spotoil, an oil additive, in P&W R-2800 engines and other medium and low-powered aircraft engines. The CAA authorization is based, however, on the use of 1 part of Spotoil to 9 parts of regular oil recommended by the engine manufacturer. It does not apply to Spotoil's suitability with detergent-type oils.

Issuance of the CAA letter followed a 1,000-hour field test of Spotoil in a Slick Airways R-2800-75 engine installed in a Westair Transport C-46F contract aircraft operating between the United States and Alaska.

An analysis of the service test, including tear downs of both test and control engines, by George C. Prill, consulting engineer, reported that:

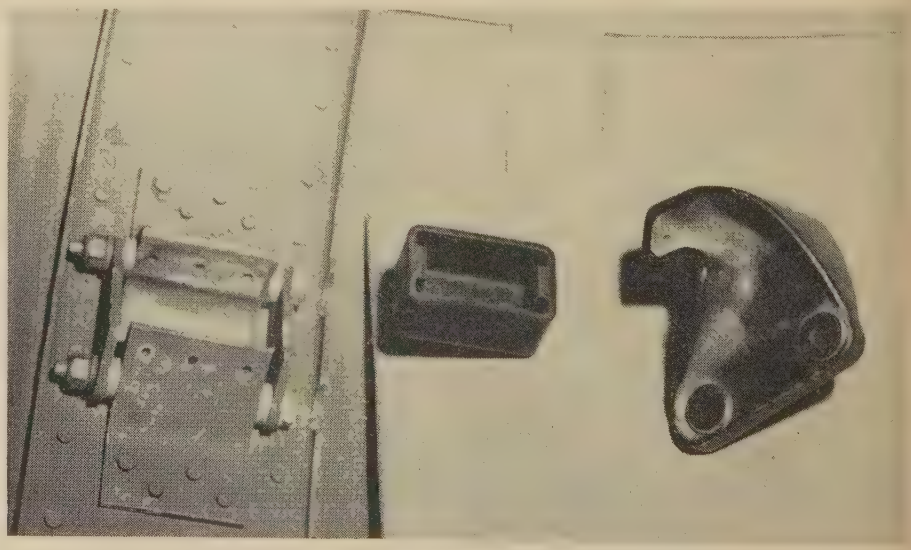
1. The addition of Spotoil does not damage high-powered aircraft engines, including those equipped with lead bearings.

2. Adding Spotoil to an engine does not appear to increase rate of wear of load-carrying parts of the engine, or its moving parts.

3. The use of Spotoil probably reduces the oil consumption of reciprocating engines.

4. Spotoil does not increase maintenance problems, but appears to decrease them due to improved lubrication and decreased blow-by.

5. The use of Spotoil does not significantly affect cylinder-head temperatures and oil pressures. Theory indicates that it should be lower if Spotoil decreases blow-by.



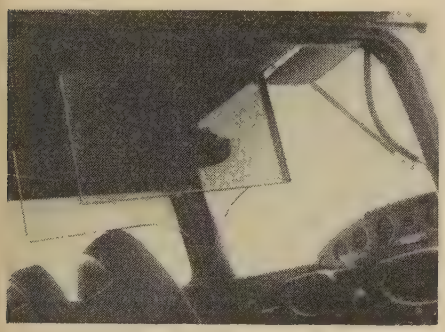
FLEX-WICH *is new cowl mounting cushion developed for Twin Beech. Molded from rubber material, it forms sandwich between engine cowl and cylinder cowling support brackets*

6. It appears that Spotoil strengthens the oil film on load-carrying parts.

Mr. Prill added that Spotoil is an oil additive that "shows considerable promise for large aircraft engines." He recommended that CAA approve the use of Spotoil in aircraft engines at all ratios up to 20% and that route operators conduct further service tests of the additive under more closely controlled conditions than were possible in the Westair tests. He suggested the use of torque meters to determine if there is any brake horsepower pick-up when Spotoil is used.

Although the CAA's "no objection" letter is the first ever issued covering an additive, Pratt & Whitney Aircraft adheres to its long-time policy of declining to approve the use of supplemental lubricants in its engines. "We cannot accept the principle of the use of additives with concentrations controlled by line personnel," R. G. Bentzinger, P&W technical supervisor, said after a study of the data obtained during the R-2800-75 test.

Additional tests of Spotoil under improved control conditions are planned by I. H. Mansfield, president of Spotoil International Sales Corp.



BLIND FLIGHT *hood is for Cessna, Beech.*

Instrument Practice Hood Designed for Cessna, Beech

Baxter Springs, Kan. A patent recently was issued the Line-O-Site Company for a new-type instrument practice hood which is suspended from the ceiling of an airplane and can be put up or taken down in less that a minute during routine flight.

Made of transparent Plexiglas and enclosing only the pilot, the hood forms unobstructed visibility for the safety pilot. The pilot "under the hood" wears red spectacles with the blue Plexiglas hood which completely eliminates all outside visibility yet permits the pilot a clear view of all his instruments.

The hood is held in place by adjustable straps that may be snapped into position in a matter of seconds. The entire hood is in one piece and, when not in use, folds flat (16 inches x 30 inches x 1 inch) so that it may be stored out of the way on the hatrack of the aircraft. It weighs just three-quarters of a pound.

The instrument hood kit, complete with all hardware, installation instructions and carrying case, is priced at $67.50 for the Cessna 140, 170, 180 and the Beech Bonanza. A kit for either an Aero *Commander* or a Beech *Twin Bonanza* is priced at $97.50.

....in the Business Hangar

J. Sheldon Lewis, Chief Pilot for Thatcher Glass Mfg. Co., writes praises for Potter Aircraft Service, Burbank, and the work done on his company's *Lodestar*. Major items accomplished in addition to the installation of a CA-20 Cabin Amplifier mentioned in June issue, included 1,000 hour airframe inspection and overhaul, tanks stripped and resealed, installation of a Sperry A-12 autopilot and approach coupler, installation of a Collins Integrated Flight System around a specially designed eyebrow lighted instrument panel, a Collins 51M 50-channel transmitter as well as a dual Collins omni. A complete Fernwell fire detection system was installed in the baggage compartments and engine nacelles as well as a three-shot CO_2 system with dispenser rings. Two 75-gallon auxilliary fuel tanks were put in, a partial new interior installed in cabin and the lavatory, the landing gear overhauled, wing ice-lights installed, and a Sperry C-4 compass and Barber-Colman automatic cabin temperature system installed.

Canadian Comstock Ltd. recently took delivery of a de Havilland *Heron*. This is said to be the first new four-engine aircraft purchased in North America for business use.

W & W Steel Company, Oklahoma City, has added a Flite-Tronics CA-1 Audio Distribution Amplifier to its Model 50 Beechcraft. Installation was done by Aircraftsmen, Inc.

Clemson Bros., Middletown, N. Y., have had their new B-50 *Twin Bonanza* in the Reading Aviation Service hangar for extensive electronic installations. In addition to a Lear L-2 autopilot, Reading installed an ARC 15-D Omni, and ARC T-11 transmitter, a Lear ADF-12, an RT-10E VHF transmitter and an ARC R-20 Marker Beacon receiver. Lloyd Yost, Clemson chief pilot, is boss of the B-50 as well as his company's *Bonanza* and Aero *Commander*.

Topic of conversation on the ramp at Southwest Airmotive recently was the L. B. Smith Co. *Lodestar* piloted by M. C. Staddon and George Walker, Jr. Minus bat wings and sporting a tail pant designed by Staddon, the *Lodestar* now offers a 20-mph gain in speed.

Jules Austin, pilot of the U. S. Corps of Engineers' C-47, brought the ship to Remmert-Werner for an engine change.

A Convair 340 purchased from Consolidated Vultee is due for delivery to the American Can Co. at Westchester County Airport on October 1. Conversion job is now underway at AiResearch in California. American Can also operates a DC-3.

Wayne R. Brodine, former Air Force captain and later copilot and pilot for Standard Oil Company (Indiana), has been named chief pilot of Standard. In this newly created position, he is in charge of the company's business airplanes, all based at Gary Municipal Airport, Gary, Indiana.

The Kimberly Clark DC-3 has added a Flite-Tronics CA-20 Cabin Amplifier. The installation was made by Qualitron, Burbank.

Don Ice and his copilot Wayne Vinson brought the Krafco Container Corp. B-25 to Aerodex for 100-hour check, spar cap modification and hydraulic work. Home base for the Krafco operation is Dallas, Texas.

Art Jones of Republic Steel Corporation brought his company's DC-3 to Remmert-Werner for installation of an airstair door and custom-built passenger seats. William B. Belden, assistant counsel for Republic Steel, is the company's NBAA representative. It was Mr. Belden who was largely responsible for the organization of NBAA.

Official NBAA Report

NATIONAL BUSINESS AIRCRAFT ASSOCIATION, INC.
(formerly Corporation Aircraft Owners Association)

National Business Aircraft Association, Inc. is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable business aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. NBAA National Headquarters are located at 1701 K Street, N. W. Suite 204, Washington 6, D.C. Phone: National 8-0804.

New NBAA Board Member

Gerard J. Eger, Secretary of the International Harvester Co., Chicago, Ill., has been appointed a member of the Board of Directors of the National Business Aircraft Association.

Eger succeeds Stetler B. Young, former President of Rynel Corporation, Sterling, Illinois, who has held the post for the past year.

A native of Amsterdam, Holland, Eger emigrated to the United States in 1920. After completing High School in 1925, he entered the Advertising Department of the International Harvester Co., advancing to the Executive Offices in 1935. In 1941, he was appointed Assistant Secretary of the Company.

During World War II, he served with the First and Ninth Air Forces. Returning to International Harvester after the war, he was elected to his present post in 1948.

Eger is a member of the Board of Directors of the American Society of Corporate Secretaries.

International Harvester Company has long used aircraft in connection with its far-flung agricultural, motor and power-equipment business. Presently, two DC-3 airplanes are being operated for executive and staff personnel transportation.

Lear Predicts Sale of 80,000 Business Aircraft

Wm. P. Lear, Board Chairman of NBAA-member, Lear, Inc., predicted the sale of 80,000 business planes within a decade. Addressing the opening session of the Aviation Writers Association in Miami Beach, Fla., he rejected previous statements by others that the expiration of the excess profits tax would cause a drop in the use of business aircraft.

"The corporation plane is a business machine just like a typewriter," Lear said. "Industry has found many uses for this type of plane and will continue to employ it regardless of tax situations." He added that "It's interesting to note that the so-called execuive plane is being used less and less by executives and more and more by engineers."

Commenting on boundary layer control, Lear declared that while the knowledge of BLC has been available for 25 years, it is only now that airplane designers are learning to use it properly. "Full utilizations of boundary layer control is between two and five years away," he said, "but when it arrives, aviation will truly come into its own."

NACA Reports Landing Speed Measurements

Business and airline transport aircraft landing at Washington National Airport usually touch down at airspeeds having a considerable margin above a stall. The National Advisory Committee for Aeronautics reports that in one out of 1,000 landings that margin probably equals or exceeds a value 60% above the stalling speed.

In photographic measurements of 478 landings made by transport aircraft in routine daylight operations at WNA, NACA found that gusty wind conditions had essentially no effect on airspeeds on contact, but had a substantial effect in increasing sinking speeds, bank angles and rolling velocities likely to be experienced for a given number of landings.

The NACA study was conducted to obtain up-to-date data on the severity and frequency of loads imposed on aircraft structure during landings. This information will aid in establishing design requirements and procedures to insure safety at the least possible cost in structural weight. N. S. Silsby of Langley Aeronautical Laboratory is the author, and the report is identified as Technical Note 3194.

CAA Issues VOR-DME Approach Procedures

The following proposed criteria have been issued by the CAA to all Regional Administrators for establishment of VOR/DME instrument approach procedures. Comments, suggestions and new ways to utilize this aid are solicited by the CAA.

DME—General

(A) DME may be used to establish initial approach and final approach fixes in connection with ILS and VOR instrument approach procedures.

(B) DME may be used to establish VOR/DME ORBIT instrument approach procedures to specific runways at airports served by VOR/DME facilities.

Initial Approaches To The Radio Facility Using DME Fixes—Initial approaches to the radio facility will normally be made over specified routes at the minimum enroute altitude of the route. This information will not be indicated on the procedure itself since it is considered as enroute information which is available from other sources. However, DME fixes will be specified on initial approach courses within 25 miles of the radio facility where a lower initial approach altitude than the MEA can be authorized. The initial approach altitude will be specified and will provide at least 1,000 feet clearance above all obstructions five miles on each side of the course from the fix to the radio facility. All altitudes will be indicated to the nearest 100 feet; *i.e.*, 1149 feet will be indicated as 1100 feet; 1150 feet will be indicated as 1200 feet, etc.

Final Approach From DME Fix to the Radio Facility on Final Approach Course—DME fixes within 12 miles of the radio facility will be established on final approach courses. Where DME fixes are established, initial approaches to the radio facility may become final approaches with the resulting elimination of the requirement for procedure turns. The final approach altitude will provide at least 1,000 feet clearance up to the DME fix and at least 500 feet clearance from the fix to the radio facility within the final approach area associated with the type of instrument approach procedure concerned.

Final Approach to Airport from Facility—Straight-in and circling minimums may be authorized by use of DME in connection with instrument approach procedures approved for the airport providing obstruction clearances are provided within the following distances:

(A) 25—12 miles (N)-1,000 feet 2 miles either side of course.
(B) 12—10 miles (N)-500 feet 2 miles either side of course.
(C) 10—7 miles (N)-400 feet 2 miles either side of course.
(D) 7—0 miles (N)-300 feet 2 miles either side of course.

Final Approach to Airport By Use of Radio Facility Located on or Near Airport—The obstruction clearances specified in 6.0300 are equally applicable to procedures predicated on radio facilities located on or near an airport.

Back Course ILS Approaches and No. 2 VOR Instrument Approach Procedures—DME may be used as a fix for back course ILS procedures (No. 2) and No. 2 VOR instrument approach procedures in accordance with approved criteria for those types of instrument approach procedures.

VOR/DME Orbit Approaches—VOR/DME orbit instrument approach procedures to specific runways may be established using VOR and DME. Orbiting procedures involve flying a portion of a circular course while maintaining a constant distance from the VOR to a final approach altitude and position with relation to a specific runway. Orbiting procedures may be specified through any portion of a 360° circle around the VOR; however,

the arc will normally not exceed 90°. Such procedures will be used to establish straight-in approaches to runways where straight-in approaches from the VOR are not otherwise possible and to establish straight-in approaches to runways not in direct line with the initial approach course.

Initial Approach Procedures and Altitudes—Initial approach procedures and altitudes to the orbit arc will be specified in accordance with criteria noted in 6.0100 above. After intercepting the specified orbit arc, track will be maintained by keeping the aircraft continuously on the arc by reference to the DME. VOR radials will be used as cross checks to determine bearings from the VOR and to determine final approach fix from which descent to the prescribed runway or missed approach point may be authorized.

Orbiting Altitudes—Procedures will normally specify an altitude providing 1,000 feet clearance over all obstructions three miles on either side of the orbit arc as determined by DME until within seven miles of the runway to which the straight-in approach is authorized. Within seven miles of the runway, as determined by a predetermined VOR radial cross check, descent to straight-in minimums may be authorized provided 300 feet obstruction clearance is provided two miles on either side of the final approach course from the fix to the runway.

Missed Approach Procedures and Altitudes—Missed approach procedures and altitudes will be standard as prescribed in the VOR criteria.

Holding—DME may be used for holding aircraft at specified distances on specified courses. The dimensions of the holding pattern airspace area for a standard two-minute holding pattern will be 8 x 14 miles lengthwise. This will provide for 10 miles on the maneuvering side of the fix and four miles on the non-maneuvering side. The width will remain constant.

Cessna Announces New Four-Engine, Pressurized Aircraft

At long last the first four-engine, fully pressurized airplane ever designed specifically for business executive use is on its way. Cessna Aircraft, already in the business market with three all-metal, single-engine airplanes and a twin-engine businessliner, recently revealed that it is well beyond the engineering and mock-up stages for a four-engine, 250-mph, eight to 10-place airliner to be known as the Cessna 620. Plans call for the first prototype to fly early next year.

Aware of the fact that the potential user of the Cessna 620 will demand the same safety standards set by the airlines, the 620 will be certified to offer the maximum in safety—the reliability of four supercharged engines, pressurized cabin and an operational altitude of over 18,000 feet, thus permitting flight over the weather.

Engines that will power the 620 are air-cooled 320-hp Continental GSO-526's, supercharged and geared. Maximum continuous power of 290 hp up to 15,000 feet from each of these engines will provide safe altitude performance far in excess of normal requirements. Three-bladed, air-

PROTOTYPE *of the Cessna 620 (artist's drawing shown here), an eight-to-10-place, four-engine, pressurized businessliner capable of speeds of 250 mph, is scheduled to fly in '55*

line-type constant-speed, full-feathering propellers will be used and, with one prop feathered, service ceiling of the 620 will be 23,000 feet.

Of low-wing design, 62% of the entire gross weight is located below the passenger compartment. This low-wing arrangement and its under-slung engine nacelles make the 620's Continental engines easily accessible without ladders or special equipment.

The cockpit of the new businessliner offers plenty of room for pilot and copilot. A full set of auxiliary flight instruments are on the copilot's side and he also has easy access to all radio controls.

Use of wing-tip tanks on the 620 makes possible maximum outboard location of fuel. A fuel capacity in excess of 400 gallons is stored in the tip tanks and the outer wing panel in bladder-type cells.

The new Cessna 620 has been designed to be completely self-supporting on cross-country trips. Entrance to the cabin is via cabin door which lowers to the ground and provides wide, easy-to-climb stairs. The cabin is heated, cooled and ventilated on the ground by a packaged unit on board which requires no external power, and adequate battery capacity plus engine preheat (optional) permits year-round operations out of large or small airports.

While no formal announcement has been made as to price of the new 620, word from one official was that it would be "under $300,000." This figure is lower than that anticipated by various members of NBAA who, as the result of a survey made several months ago, listed their specifications for the "ideal" business airliner as an eight-to-10-passenger airplane that would cruise at 300 mph, be pressurized, and have a range of 1500 miles.

Final formulation of Cessna's production and marketing plans for the new 620 will be subject to the results of a thorough market survey which is scheduled for completion this year. Until those results are known, no production schedule will be set up and no definite marketing plans formed. In the meantime, however, work is going ahead on the building of a Number One Cessna 620 businessliner.

NBAA Dallas Convention to Cover Many Important Subjects

Safety, research and development, aircraft design, pilot proficiency and standards, business aircraft administration, weather services, communications and high density air traffic developments are among subjects slated for thorough discussion during sessions of the 1954 annual convention of the NBAA in Dallas October 27, 28 and 29.

The subjects will be covered at forum-type meetings led by nationally-known business flying leaders chosen from 400 or more business aircraft owners and their pilots who plan to attend this "biggest, best and most" convention. Cole H. Morrow of J. I. Case Company, NBAA board chairman, reports that "more emphasis is to be placed on round table airing of business flying problems and less time to formal speeches."

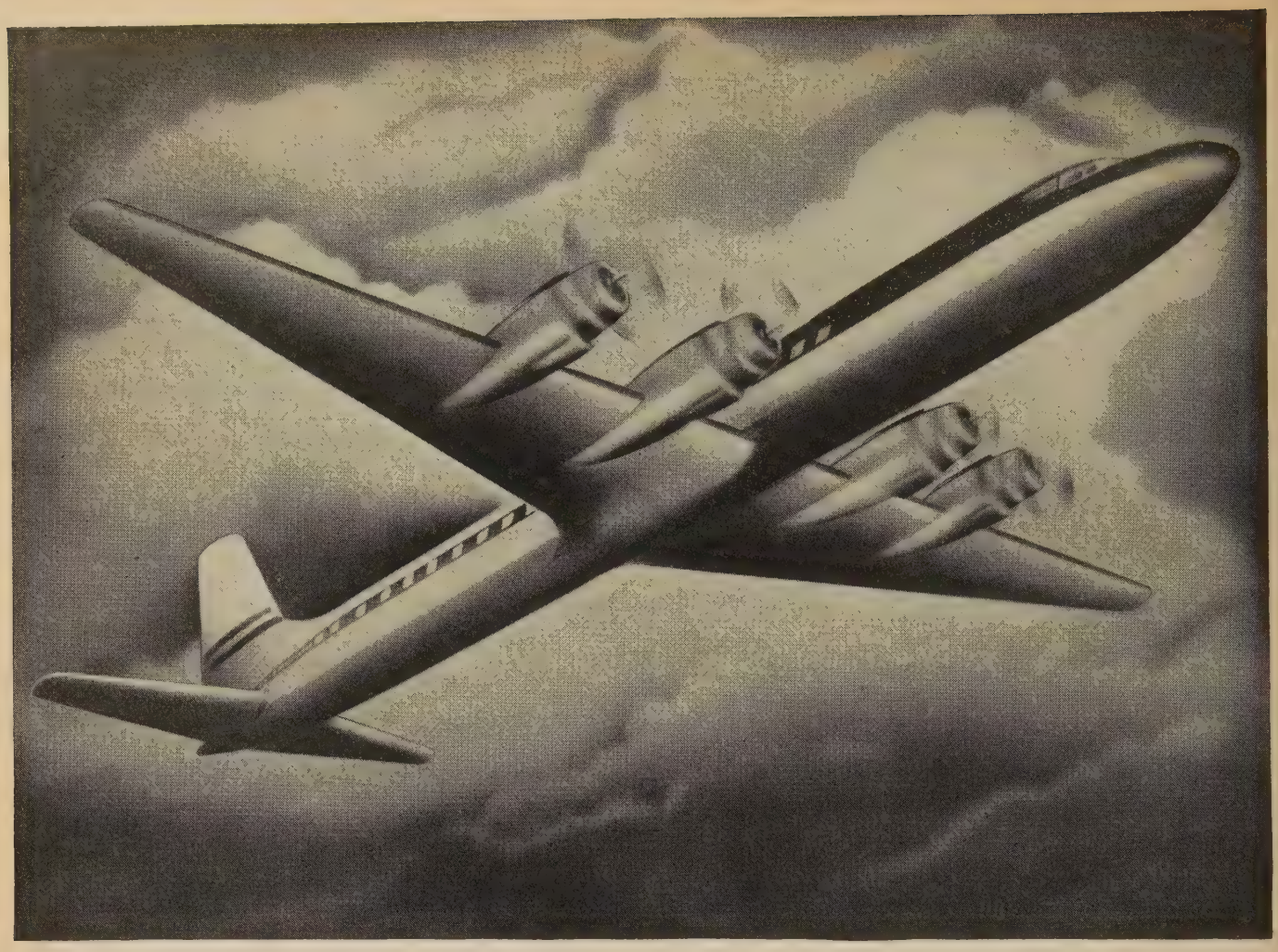
Other events on the three-day program will include:

Presentation of NBAA's annual meritorious awards to member organizations and proficiency certificates to outstanding mem-

(Continued on page 46)

SKYWAYS FLIGHT OPERATIONS ROUND TABLE

A SKYWAYS Round Table discussion on an important subject of current interest to business aircraft owners and pilots will be held during the 1954 convention of NBAA in Dallas next month. A monthly feature in SKYWAYS, the Round Table is recognized as one of the most popular, authoritative and informative forums in aviation publishing. Approximately 15 leaders in business air operations will participate in the Dallas Round Table, scheduled for 11:30 a.m. Thursday, Oct. 28, in Parlor B of the Hotel Adolphus.



new *SAFE FLIGHT* SPEED CONTROL SYSTEM zeros you in at perfectly controlled minimum speeds!

SAFE FLIGHT
Speed Control Indicator
Plane is being operated at proper speed when pointer is centered. Fail safe flag alarm guards against any malfunctioning.

Now—continuous direct information about wing lift at a glance! The revolutionary Safe Flight Speed Control System eliminates last minute calculations of gross weight, acceleration, configuration, turbulence, etc. . . . automatically displays the best lift coefficient at critical take-off and approach speeds. Fewer high-speed landings with excessive wear on brakes and tires. No excessive reverse pitching and overshoots!

Constant checking of the airspeed indicator is unnecessary: when the pointer of the Speed Control Indicator is on the triangle, speed and attitude are correct . . . initial climb is best under existing power and weight conditions. The Speed Control System's instantaneous non-lagging operation is particularly important in the event of engine failure in multi-engine aircraft after take-off.

Speed Control System components, including the Safe Flight Lift Transducer and Lift Computer—are rugged in design, unusually free of maintenance. Wing transducer coils are completely sealed. Flag alarm provides fail-safe indication.
Speed Control System meets all pertinent Air Force, Navy and Civilian specifications.

Write for detailed information.

SAFE FLIGHT INSTRUMENT CORPORATION

"Pioneers in Lift Instrumentation"

WHITE PLAINS, NEW YORK

Jeppesen and Co. Markets New Flight Desk Pilot Aid

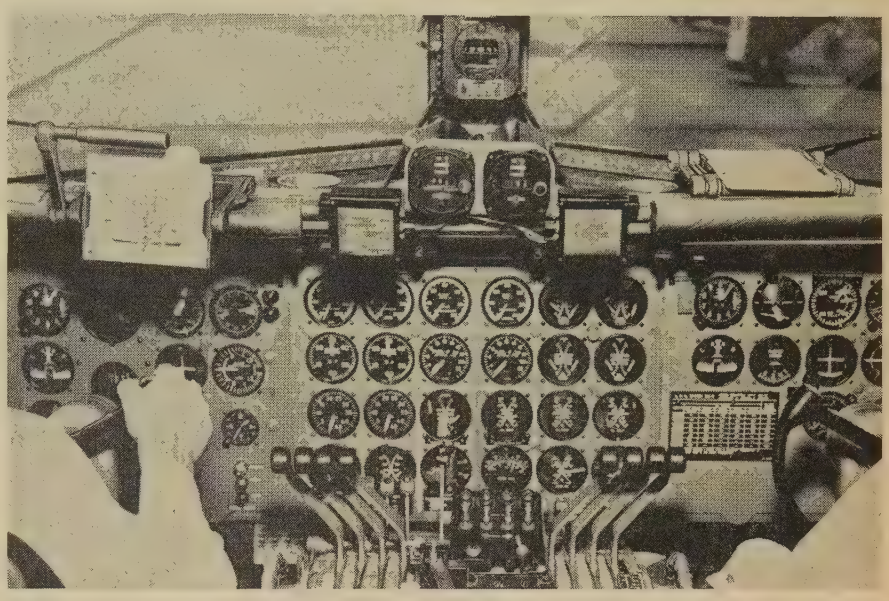
In every field of endeavor, whether sports or commerce, professional or amateur, some name becomes associated in common usage with a device, a technique, etc., as such a standard of excellence that it qualifies for a dictionary listing. Examples are "Cub", "Link", once indicative of a particular plane or device, now encompassing a whole field of airplanes and flight simulators.

Such a name is "JEPPESEN" or "JEP" or "AIRWAYS MANUAL", whichever you prefer to use. But whichever you use, every pilot thinks instinctively of the crutch with which professional cross-country pilots have navigated for 20 years. There have been other abortive attempts at supplying the pilots needs in IFR cross-country, some with excellent lead ideas. But through the years, only "JEP" has remained faithful, always changing to keep up with the industry and changes in the art.

The need for some means of supporting flight charts and data, other than the common precarious habit of employing the pilot's lap, has been evident for many years. Some devices were attempted, *i.e.* common clipboards clamped to wheel, or knee, etc. But always the hampering of the pilot's leg movements, or inability to read during constant wheel movement in rough air or under poor lighting, etc., saw these efforts die aborning.

JEPPESEN & CO. have been looking for a long time for the "right" answer to this problem and through the small firm of CLOWD, Inc., Arcadia, Cal., they found it. Designed by the airline pilot-president, Larry Shapiro, "Flight Desk" has been proved by over 8,000 hours of flight testing in single-engine, jet and multi-engine aircraft.

"Flight Desk" is a precision-engineered navigation-chart holder for the holding and lighting of flight information material near the pilot's most normal line of sight. It eliminates the temptation to rely upon memory, or searching for enroute or approach charts hastily laid aside after earlier reference, and reduces pilot distraction to an absolute minimum on this score. It literally makes the navigation data sheets an integrated part of "full panel" flying.



FLIGHT DESK, *shown open for use at left and closed at right, is reported to reduce handling of printed operations material by 80%, and eliminates much pilot distraction*

Distraction resulting from consulting reference data resulted in inattention to other critical phases of flight, even under the best lighting conditions. "Flight Desk" reference is so akin to reading just another instrument on the panel that it comes naturally on the first try.

Previous reference-handling procedures were such that many pilots were easily discouraged into trusting memory at a time when material confirmation is most critical.

The lighting design puts the light, with any desired intensity of *red* or *white*, close to the navigational material without flooding the cockpit or impairing night vision of the crew. It is possible to make flight-log notations and clearance copying without using flashlights or other unsuitable cockpit lighting.

Time and motion studies showed that the time spent in handling and referring to operations material can be *reduced up to* 80% when using the "Flight Desk".

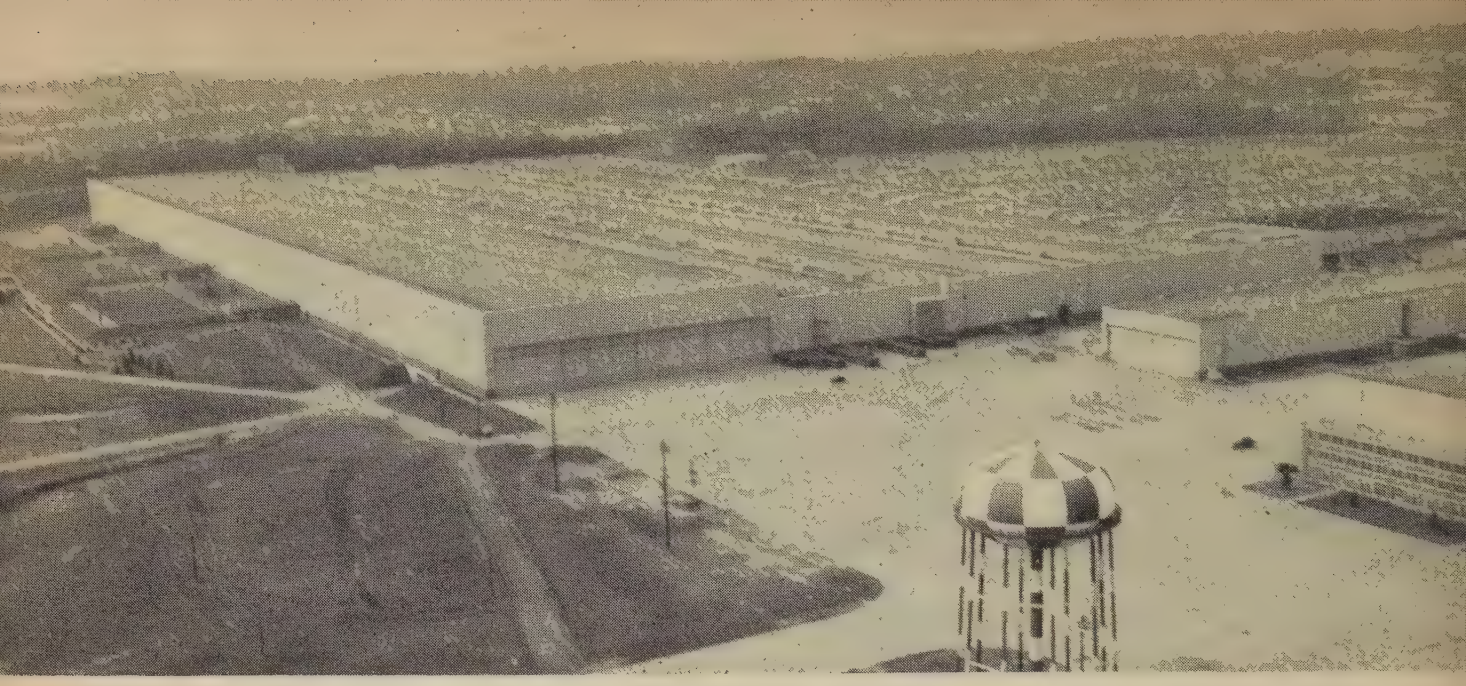
The device permits a pilot to have properly lighted approach charts continuously near his line of vision during an entire instrument procedure, yet at time of break out and touch down, the unit and material are easily and quickly placed in the stowed position out of the way of cockpit movements and necessary visual field for landing.

It is hardly necessary to remind professional pilots that in an area like Chicago or New York, there are over 180 navigational reference items within a 40-mile radius that they must be prepared to refer to or employ on instruments as the need is indicated. It is impossible for the pilot to forecast today better than a rough idea of the routes and facilities that may suddenly become of vital importance to his operations tomorrow.

Another virtue of "Flight Desk" is the "one-handiness" of the device. Once installed, full operation of the device, entailing insertion and removal of data sheet, adjustment of position, or lighting can be accomplished with one hand, and be relied upon to remain as desired. Nine inches wide, 4½ inches high, and nine inches deep when in use, the "Flight Desk" becomes a flat 1-3/16 inches for storage when not in use. It can be mounted right or left, to open up or down, as desired. It does not obstruct either the windshield pattern (a "must" in today's high-density, high-speed areas) or the instrument panel and reduces eye travel on the part of the pilot to an absolute minimum.

Vibration, rough air, or aircraft

(Continued on page 28)



Aerial view of nation's biggest integrated aircraft manufacturing plant in Marietta, Georgia.

ALL THESE FACILITIES

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ECONOMY AND EFFICIENCY!

In Marietta, Georgia, the nation's biggest integrated aircraft plant has never missed a delivery schedule.

Government Plant No. 6, operated by Lockheed Aircraft Corporation.

B-47 Multi-Jet Bombers on Marietta flight line before joining U.S. Air Force.

The minute you step inside Lockheed's Marietta, Georgia, factory, you are impressed with the overwhelming size—seemingly endless production lines integrating every conceivable facility for making all types of aircraft. This plant is particularly suited for the largest airplanes—bombers, tankers and transports.

The main assembly building covers 47 acres *under one roof*. The final assembly area alone is nearly half a mile long. In this giant structure are the newest automatic machines to form, mill and turn steel, aluminum and heavy alloys. The Onsrud Spar Mills can mill in one operation a 48-foot aluminum alloy plate weighing a full ton into an integrally-stiffened wing panel. Overhead cranes for lifting such huge units are completely radio-controlled.

This bigness saves *you* money because it means more efficient, more economical aircraft production. It provides maximum flexibility in production planning. Consequently, with minimum effort, the Marietta factory can be arranged to handle any design or any type of aircraft, guaranteeing a continuous flow of material from the raw state to the completed airplane. Today, more than 45,000 different parts are being manufactured at Marietta.

That's why the U.S. Air Force selected the Marietta factory to build multi-engined B-47 Jet Bombers and C-130 Turbo-Prop Combat Cargo Planes. In the more than three years under Lockheed management, this Marietta plant has never missed a delivery schedule. And today, new cost and performance records are winning additional commendations from the USAF.

Look to

LOCKHEED

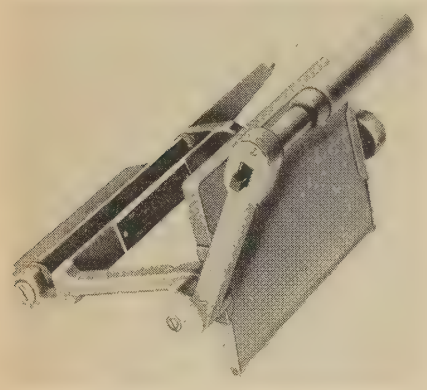
for Leadership

LOCKHEED AIRCRAFT CORPORATION
MARIETTA, GEORGIA, AND BURBANK, CALIFORNIA

Jeppesen and Co. Markets New Flight Desk Pilot Aid

(Continued from page 25)

maneuvers (these were tested in jets!) will not affect fixed position of the light arm. The light switches ON and OFF automatically when the Light Arm is extended from or retracted to its recessed cradle. Intensity is rheostat-controlled and the pilot has a choice of red or white light at any position within a 340° vertical arc. Although it cannot come loose when in the positive lock position, the Board Assembly, by rotating to a detent position, can be easily lifted out and taken to flight planning or briefing rooms for pre-loading if desired, or for removal and stowage at flight termination.



CLOSE-UP *of Jep's new 9" x 4-1/2" navigation-chart holder, showing light switch*

Navigation data is easily slipped under the spring clips on the sides, and the pilot can make notations with one hand without shifting his material. The board holds up to 40 single sheets of reference data and may be pre-loaded for an extensive flight operation so as to utilize each chart in sequence and "snap-out" without disturbing remaining material, as the flight progresses.

The days of lap-holding of bulky books sliding between knees, stuffing of pages under cowling copings, weighting-down chart sheets on the throttle-quadrant pedestal with cups of cold coffee, are gone with no lament when "Flight Desk" is installed. Along with the latest in radio and instruments, it belongs in every plane equipped for radio and instrument navigation for easier safer flight.

Air-Aids Spotlight

AIRWAY FAN MARKERS—*Indicative of the increasing need for airborne DME installations is the fast disappearance of these enroute-distance position-check facilities. The following should be off or "suspect" on your current JEP-RF charts (not included, many more decommissioned in past six months):-*
ALBUQUERQUE, N. Mex.—*Juan Tomaz FM*
ALLENTOWN, Pa.—*Topton FM*
AMARILLO, Tex.—*Amarillo and Soucy FM's*
ATLANTA, Ga.—*Smyrna FM*
BILLINGS, Mont.—*Billings FM (Park City FM now 3 dashes)*
BOSTON, Mass.—*So. Boston FM*
CASPER, Wyo.—*Midwest FM*
CHEYENNE, Wyo.—*Hillsdale FM*
DALLAS, Tex.—*Fornez FM*
DENVER, Col.—*Watkins FM*
FT. BRIDGER, Wyo.—*Evanston FM*
FT. JONES, Cal.—*Callahan FM*
FT. WORTH, Tex.—*Haslett FM*
HOUSTON, Tex.—*Webster FM*
JACKSON, Miss.—*Pelahatchie and Florence FM's*
JACKSONVILLE, Fla.—*Bayard FM*
KANSAS CITY, Mo.—*Linkville FM*
KEY WEST, Fla.—*Stock Island FM*
KNOXVILLE, Tenn.—*Watts Bar FM*
LAS VEGAS, N. Mex.—*Maxwell FM*
MIAMI, Fla.—*Krome FM*
MIDLAND, Tex.—*Stanton FM*
NEW ORLEANS, La.—*LaPlace FM*
OKLAHOMA CITY, Okla.—*Washington FM*
SAN FRANCISCO, Cal.—*Belmont and Half Moon Bay FM's*
SAVANNAH, Ga.—*Richmond Hill FM*
SHREVEPORT, La.—*Dixie FM*
TAMPA, Fla.—*Lutz FM*
TEXARKANA, Ark.—*Prescott FM*
WICHITA, Kan.—*Kechi FM*
WINSLOW, Ariz.—*St. Joseph's FM*
WINSTON-SALEM, N. Car.—*High Point FM*
YOUNGSTOWN, O.—*Augustus FM*
AMBER 7 Airway—*NEWARK—PHILADELPHIA first segment of proposed low-altitude radar-controlled airway to DCA.*
AMBER 9 Airway—*Decommissioning of NEW BERN VAR should mark beginning of transition to Victor airway along coast.*
RED 31 Airway—*This MINNEAPOLIS-CHEYENNE route deleted as far as HURON, S. DAK.; now roughened by loss of PHILIP and CHADRON radio beacons making LF jumps over 150 miles when VHF facilities unusable.*
GREAT FALLS, Mont.—*ILS Outer Compass Locator now on 407 KC.*
CINCINNATI - DAYTON-COLUMBUS AREA—*Low-altitude control between towers easing traffic delays in this area.*
INDIANAPOLIS, Ind.—*ILS back-course procedure landing Runway 22 requires two VHF navigational receivers operating (to take magnetic bearings on IND VOR for cross fix) unless radar mileage checks are employed!*
MORRISTOWN, N. J.—*Tower now transmits on 121.3 mc.*
VERO BEACH, Fla.—*BMH radio beacon now on 209 KC.*
TWO-WAY RECORDINGS—*Success of two-way recordings at LaGuardia and Idlewild have spurred installation program. Washington Tower and Center are now equipped and 23 other major airports and centers will follow. Nothing is so convincing as your own voice when question arises as to who said what?*

Airways Aids Increased Despite Economy Program

When any government agency announces plans to increase its services to the public while reducing its demands on the public treasury, the shock is enough to warrant close inspection of this highly unbureaucratic maneuver. In a bulletin put out for the information of agency personnel only, the Federal Airways Operations department points out that the keynote of the fiscal 1955 program will be maximum service at minimum cost, plus additional improvement in airways maintenance and operations services.

As an illustration of this policy already instituted, it is noted that the

ratio of field (or working personnel in more or less direct contact with the flying public) to office or supervisory personnel has gone from 97:1 to 167:1 in one year, despite an overall decrease in the total payroll of the department. In effect, more meat and less fat on the bones, albeit some arrested growth.

Overshadowed by the excessive publicity given the gradual curtailing of the older LF facilities, has been the increase in the new and more efficient VHF facilities, both along the airways and in terminal areas, plus increased radio-beacon facilities and combined control communications facilities.

Despite reduced manning tables, the number of operating positions in Centers is being increased to reduce delays now being encountered by excessive and dangerous workloads. Additional combined tower and communications stations are planned for Bradley Field, Buffalo, Charleston, Elmira, Lexington and Wilkes Barre in the northeastern region, with additional facilities at Albany, Dayton, Louisville, Richmond, Toledo and Youngstown in the second year. These schedules are subject to re-arrangement as operational necessity demands. Lynchburg is reverting to a pure communications station in July for lack of traffic warranting a control tower.

Radar facilities continue on the increase despite some slowing of the program due to curtailed funds. Baltimore (Friendship), Cincinnati (Kenton), and Louisville (Standiford) will get their Airport Surveillance Radar this year and possibly replacement of the older equipment at Cleveland, Idlewild, LaGuardia and Washington. Pittsburgh (Greater) will get its Precision Approach GCA, and that for Philadelphia and Newark is now being installed.

Airways users will soon begin to hear the term "IFR Room" and it would be well to explain that this is an improved arrangement of the instrument operations facilities at a terminal airport so that all control related to IFR operations as opposed to visual operations and control will be conducted in closer coordination and with greater assistance from radar than heretofore. Prime examples which should be viewed by seriously interested pilots are Chicago, N. Y. International (Idlewild) and soon, LaGuardia.

Of equal interest is the first fully radar-controlled airway between Washington and Norfolk which will be possible when both the CAA facilities and the long-range USAF radar are able to bridge the gap between

the latter area and the present Washington long-range radar.

VOR's that have already been mentioned heretofore in NAVICOM as on the way are Ford City, Pa., Houlton, Me., Johnstown, Pa., Marienville, Pa., Perro, O., Ramapo, N. J., Stroudsberg, Pa., and Williamsport, Pa. VHF Terminal Omniranges (TVOR) are planned for Altoona, Pa., Roanoke, Va., and Cincinnati, O.

Remote VHF facilities for better Center service are scheduled for Boston and Philadelphia areas, and Boston, Cleveland and New York are looking forward to receiving their long-overdue and badly needed VHF Direction Finders which are expected to eliminate some of the most aggravating and costly delays on instruments in those areas.

One of the happiest and simplest solutions to quicker clearances and handling on the densely travelled eastern routes has been the innovation of Low-Altitude Control between adjacent Approach Control Towers. The elimination of necessarily circuitous handling via over-worked air route centers for short-distance IFR flights has been equally gratifying to center, tower and pilots alike. The accompanying chart forecasts the picture in the eastern region as it should look at the conclusion of fiscal year 1955.

It is emphasized that the entire program is undertaken with full realization of the increased workload on all facilities and personnel and the penalty of reduced attention to purely planning theory. The year may end with nowhere to go in 1956—for lack of funds.

Pilots Warned of Maintenance Work In Progress At Nav-aids

During periods of routine or emergency maintenance (which will be NOTAM'd in the usual manner), identification will be removed from certain airways Navaids (radio navigational aids), namely, ILS Localizers, VHF Ranges (VOR, TVOR and VAR), and LF ranges and radio beacons. This new policy relative to signalling pilots that maintenance work is in progress at these facilities was established for all sections of the country in May of this year.

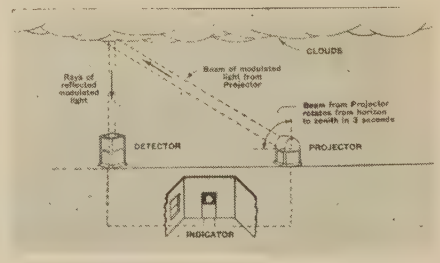
The removal of identification serves as an additional warning to pilots that the facility has been officially taken over by "Maintenance" for tune-up or repair and may be unreliable even though on the air intermittently or constantly. This procedure will not supplant the official NOTAM.

It is felt that, for reasons of time or other circumstance, many pilots fail to receive or adequately note such NOTAM warning prior to initiating use of such a facility and may be tempted to employ same without careful aural monitoring or may inadvertently rely on same as result of hearing or receiving apparently normal signals. Lack of the identification on the appropriate frequency should be akin to the visual flag warning of visual-indicating Navaid airborne equipment, which type of warning signal may not be actuated by the nature of the "outage" existent or created by "maintenance".

Crouse-Hinds Develops New Break-Out Ceiling Indicator

Like death and taxes, ceiling and visibility are factors which are of paramount importance in every professional pilot's life but about which he can do little except bow to the inevitable. Until recently, he had no choice but to accept a standard of weather measurement taken at a site often quite remote from the point of final let-down on IFR approach.

With the introduction a short time ago of the visibility transmissometer, taking "slant visibility" along the line of the final approach path outward from the airport boundary, the pilot became able to receive from the tower (with whom he is in last and most direct radio contact) accurate and instantaneous reports of the actual visibility he will encounter during that most critical part of his approach.



LINE *drawing of the "break-out" ceiling indicator developed for pilots*

When ceiling conditions are a factor of the approach, all pilots are faced with the psychological problem produced by executing a let-down to their minimums with ceiling reported below those minimums. During the approach, descent procedures are based on the strong anticipation that a go-around will be necessary. After seeing the runway or ground at minimum altitude, although still above reported ceiling altitude, the pilot can anticipate facing an accusation that he violated published minimums.

The visibility transmissometer resolves half of this predicament. Now Crouse-Hinds, in cooperation with the Weather Bureau, announces the resolution of the other half.

Their new rotating-beam ceilometer light system has been service tested, and installations at most high-density terminals should follow in due course. The ceilometer is located in the main runway approach zone between the middle marker and the end of the runway (the old ceilometer was often placed on a terminal building in excess of a half-mile or more from the point of "break-out"). It records almost instantaneously and continuously the heights of cloud layers above the point of average break-out at the usual minimums.

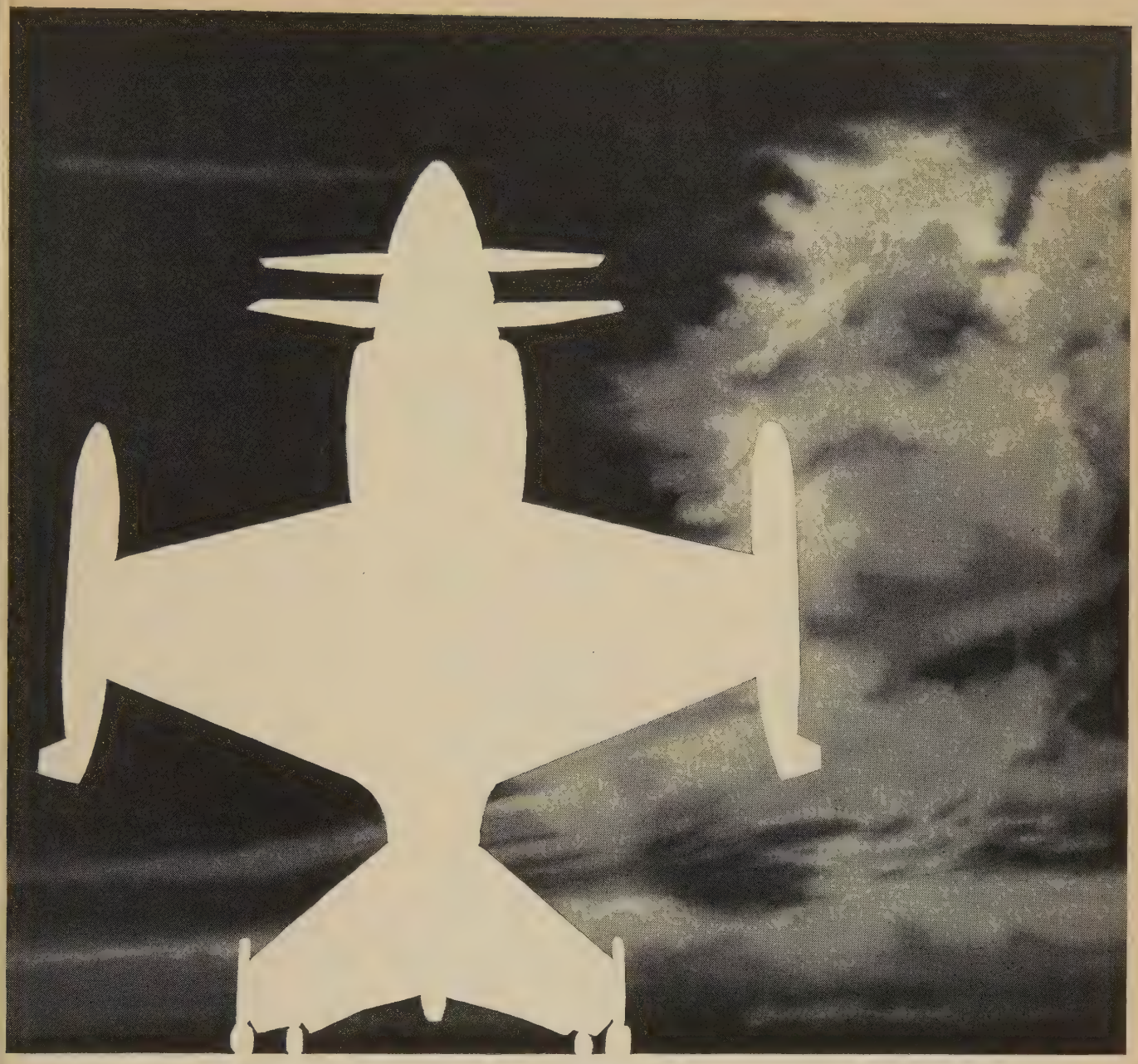
It consists of three components; a projector, a receiver and an indicator. Employing the usual triangulation method, these units are set along a fixed base line. The projector consists of a rotating mirror assembly, made up of two 24-foot precision parabolic mirrors mounted 180° apart. To enable the light signal to be differentiated from ordinary daylight, a four-vaned cyclindrical shutter, enclosing a 250-watt lamp, is mounted at the focus of each mirror. Each shutter revolves at the rate of 1800 rpm producing 120 light pulsations per second.

The ceilometer receiver also is equipped with a 24-foot mirror which faces vertically upward through a water-tight glass cover. The mirror's centerline is in the projector's plane of rotation so that a lead sulfide photoconductive cell, located at the mirror's focal point, picks up the pulsating flashes given off by the projector as the light beam is reflected by the cloud ceiling directly overhead.

The angle of the projector beam at this instant is transmitted by radio (usually a low-power two-way commercial system) to the ceilometer indicator which converts the signal into a foot measurement of ceiling height.

The indicator is to be located in the airport weather observatory or, like the transmissometer, it could be located in the tower for more instantaneous reports to the pilot on approach, with a system for relaying or repeating the information to the Weather Bureau for the usual dissemination.

When the tower report of instant ceiling and the altimeter reading coincide, it is a good bet that the designated crew member who then takes his eyes off other equally critical duties, will look up at just about the right time for "breakout".



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TV Towers

(*Continued from page 15*)

pilot of a tall structure in the vicinity and tell him where it is?

There must be some reason why nothing has been done to clear the tower atmosphere, both figuratively and literally. However, naught can be gained by digging around for causes at this time. Neither will it further aviation's cause one iota to point an accusing finger at anybody, be it the big bad broadcasting business or any of the Government agencies involved.

Now that three video installations have been demolished, the TV operators are coming to the belief that, perhaps after all, the aviators weren't just being neurotic in their protest that all tall structures are menaces to flying in thick weather. And by the same token, with proof at hand that skill at instrument flying does not automatically overcome what would seem to be the inexorable magnetic attraction tall objects exert on aircraft, it is agreeable to note that the enforcement waters in Washington are slowly beginning to churn. A new "Special Working Group" of the Air Space Subcommittee has been organized and it may be expected that a greater part of the present unwholesome situation will soon be flushed away.

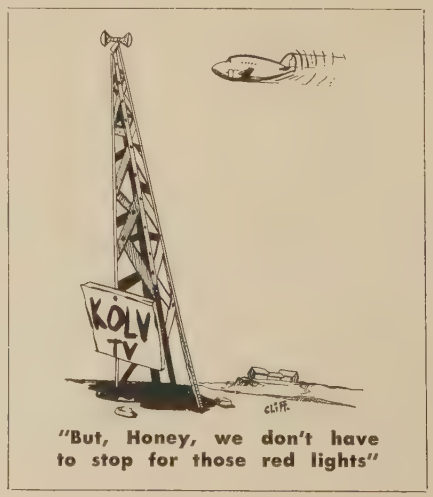
Even though it is possible to regard past events in a calmer light, it still bears recalling that at the outset of the TV-license application hearings all of the applicants wore an air of annoyance at aviation's ill-humored objections to the heights and sites of most transmitters. They, the TV-sters, made it crystal clear that they regarded these objections as unreasonable exaggerations. They conceded there might be a small likelihood of a tower being hit sometime in the distant future, but the odds against such an eventuality were away up in the million-to-one category.

Another stand taken by the Telecasters was a consistent and very persistent attempt to heap the burden of averting collisions onto the shoulders of aviation. Over and over again each applicant belabored the point that, since antennae are stationary, it should be up to the flyboys to steer clear of them—which, patently, represents the logic of individuals who have never experienced the clammy hand of doom clutching at their souls while moving through a blanket of gray upwards of 100 mph. Such persons cannot comprehend the feeling of helpless abeyance that gnaws at you all during blind flight unless they have undergone the ordeal themselves. It must be assumed that in only a very few TV minds has the idea dawned that aircraft do not run on rails; that they must have latitude of movement as the prime requisite to safety.

As for the Government agencies' willingness to go along with the Television view, there are several justifications which bear consideration, if not forgiveness. Important among these, from a Civil Service standpoint, is the one best described as knowing which side of the bread is buttered; sometimes called the "baby-needs-new-shoes" excuse. No man in any of the aeronautics branches is going to lead with his chin against the Radio-TV colossus; not unless he is willing to kiss his accrued retirement benefits goodbye and commit economic suicide.

Staff members of the FCC, also Civil Service employees, are further faced with a welter of technical hurdles which lend a heavy influence in arriving at decisions to grant video permits. To cite a simple instance, there is the necessity of spacing stations using the same channel (with transmitters over a certain height) at least 196 miles apart. This is to prevent signal-overlap. And there are other factors of a similar kind to be taken into consideration.

These small explanatory excursions have not been taken by way of apology for the Government people. Civil Service men and women, by and large, are as hard working and conscientious as any group to be found anywhere. But they have their bosses, even as you and I; the big difference being that they have many more of them than you and I will have in our entire careers. Furthermore, the welfare of their families depend on their being able to do some fancy tight-rope walking from time to time. In the Washington Hippodrome you develop an acute sense of political balance right away, else you fall flat on your face in oblivion.



"But, Honey, we don't have to stop for those red lights"

Finally, before getting back on the main track, the CAA seems to have run into a dead-end street insofar as the tower business is concerned. The fact is that they haven't any money; not a dime to spend on research and experimentation necessary to working out a solution. The only preventative medicine they are able to dose out are two mild little notices in NOTAMS concerning each new transmitter. The first one when a TV-ster files intentions of constructing his aerial gaff and the second one when it is up and ready for a catch. They are planning to run an extra "in-between" notice when the tower is half completed. But what good are all the notices in the world when you are battling invisibility—even if you are that rare sort of a pilot who faithfully puts such information on your maps? (If there are 50 pilots in the country who do, I'll eat the scrawniest old crow you can find, feathers and all).

In spite of the technical obstacles and the strangling creepers that abound in the political jungle, it remains difficult to grasp the reasoning behind the Air Space Subcommittee's action in granting permission to install five outsize transmitters on what are the most unacceptable sites in Kansas City, Mo. (*See Instrument Approach Chart, page 14)*

The first of these to go up, back in 1949, (*marked* A *on chart*) was WDAF-TV, a 912-foot monster owned and operated by the famed crusading Kansas City *Star*. This tower rears its lethal head at a spot approximately 2½ miles due south of the Municipal Airport and less than 2,000 yards east of the center line of the Blue Civil Airways 13. (The Air Transport Association protested against this installation but evidently they protested too little. And wisely so, at that, for the *Star* throws a lot of weight around out in that section of the country. However, one thing is certain, the worthy *Star* won't receive a shining welcome in many a Kansas City home when and if their tower pulls down a package of flaming death upon the heads of the peaceful burghers residing below).

Next, in June 1953, came KCTY, a 758 footer (*marked* B) doing business on a spot approximately 4 miles S/SW of the airport but smack-dab in line with the ILS runway. (What happens when you miss on your approach, are in trouble and of necessity must fly straight ahead?)

Soon thereafter, August 1, 1953, two new stations began operations,

both with transmitters rising more than 1,000 feet above the Municipal Airport elevation. One of these, WHB-TV, 1,025 feet (*marked* C), stands close enough to cast its morning shadow across the *Star* tower. While the other one, KMBC-TV, 1,028 feet (*marked* D), evidently believes in spreading the menace; this antenna scrapes the sky exactly one mile north of the busy 31st Street Airport. (A strange relationship exists between these stations in that although they share the same channel —different times of day—they built separate transmitters, each running into hundreds of thousands of dollars).

To round out the Kansas City quintuple threat to aviation, we find KCMO-TV, 949 feet (*marked* E), nestling in snug juxtaposition to those marked A and B, some 1,000 yards or so west of the SE leg of the Kansas City Radio beam. This last addition to the web of guy wires and spires completes an eerie mesh curtain that would make a pilot coming in from a southerly direction sweat freely even on a clear day.

In view of such a deplorable situation, it is to wonder what the Air Space Subcommittee was thinking when it granted permission for the erection of these Kansas City Killers. But whatever their thoughts, here in capsule form is the general attitude of that group: (*to wit*) The problem can be solved with respect to instrument pilots. The key to the situation is Minimum Enroute Altitude. This minimum is set at 1,000 feet above the top of the tower on the Airways and 500 feet off the Airways. Thus, the pilot, obeying the safety rules cannot hit a tower.

On the subject of tower marking, the ASS is as far pro-TV as the law will allow. As has been said, all of the ideas introduced by aeronautics experts before the Working Group were tossed overboard in accordance with the TV-sters' judgement on the worth of each particular device. One of the suggestions was that large metal balls be attached to guy wires for easy discernment. This was dismissed because it was believed that objects suspended from the guy wires might cause vibration. This, in spite of the fact that the Swiss have been using this type of marker for years.

And the TV-sters excuse for not wanting to install 100-watt marker lamps on the wires (which the ASS agreeably supported, too) was that it would be too much trouble and expense to service the lights. Who, they wanted to know, would change the lamps when they burned out? A like argument was put forth on the matter of painting the towers with reflective paint; who would repaint them every six months?

In rebuttal on these two points, it might be said that steeplejacks make their livings doing jobs such as these, and their services not only cost far less than it costs to rebuild a transmitter but the lower collision insurance premiums on a properly marked tower would more than pay the upkeep costs.

At any rate, now that the TV-sters realize that instruments are not infallible, that any man moving about in darkness can run into things, it behooves the interested aviation parties to cling to their mental aplomb in order to show the new Working Group the sane way to go about working out a satisfactory answer.

A good way to approach this desired end is to analyze the Kansas City case and go forward from there. Be it said in passing that Kansas City is not being held up as the horrible example. There are other cities with conditions equally bad; like Indianapolis where ASS allowed a 1500-foot tower to be built virtual-

(*Continued on page 34*)

TV Towers

(*Continued from page 33*)

ly on the lip of the Instrument Approach runway, or Boston, where a new company held out with true Yankee tenacity against the suggestion that their transmitter be placed atop a tall building in the middle of the city. Not by a jugfull, they wouldn't build it there; if they were going to have the proper coverage and meet the competition, that tower simply had to be out there adjacent to the East Boston Airport where betting insists it will be knocked over within five years.

But getting back to the Kansas City case: The Air Space Subcommittee's first and big mistake was in allowing the TV applicants to pick their own sites for the proposed towers. Undoubtedly, this same error was made over and over again in regard to other communities. Instead of presenting a conciliatory "what'll-it-be-boys" front, the committee should have adopted a firm "this-is-what-you-can-have" attitude based entirely on the safety requirements as portrayed on the Instrument Approach Chart for the city. There are too many lives and too much treasure at stake to brook more than the minutest compromise with safety. Besides, no matter how you prize video's contribution to our lives, it still comes as an encroachment and has no moral or legal right to dictate policies.

Had the Subcommittee assumed its proper role at the Kansas City hearings, the selection of transmitter sites would have narrowed down to one of two choices, depending on whether you are of the single-tower school of thought or are an advocate of the "antenna farm" system of isolation. If of the former persuasion, you would have unhesitatingly selected that 1,423-foot building (*marked* F) as your choice. This structure rises 665 feet above the airport elevation and is close enough to the field to not be bothersome. Moreover, the worry about weather minimums would be eliminated, thanks to the fact that the *bottom* of the tower would be in the overcast well before the 500 foot minimum had been reached.

Preeminent among the single-tower proponents is J. B. Hartranft Jr., president of AOPA, who goes so far as to insist that the economics of the case actually justify tearing down the forests of towers everywhere and replacing them with single communal transmitters. As a part of AOPA's unceasing safety campaign, "Doc" Hartranft has taken a long and sharp look at the tower picture and has come up with some figures that prove that station owners could actually *make* money by following his suggestion. In a statement made to your *SKYWAYS* reporter, Hartranft said: "Let a few more transmitters be destroyed, to the tune of approximately $1,500,000 each, and the insurance companies will be forced to make drastic increases in their rates; sufficiently high so as to seriously impair the earnings of the entire TV industry. On the other hand, should the Television industry adopt the single-tower idea the difference in collision insurance premiums will pay for the bigger and better transmitters in short order. Thereafter these savings could be regarded as earnings derived from sage investment."

The "antenna farm" desciples point with satisfaction to the arrangement out in the Los Angeles area, where all of the TV towers are grouped on top of Mount Wilson. Their argument, and it is a sound one, is that with all of the tall obstructions bunched together at a known place on the map, pilots will more or less instinctively give that place a wide berth. All will agree that this is far better than trying to weave in and out through a maze of individual spires sticking up hither and yon in the soup.

A quick glance at the Kansas City Chart shows several excellent spots for "antenna farms"; one good site would be at a place about 6 miles due west of the Municipal Airport (*marked* G), well out of the way of all air traffic. However, since there is not the remotest chance of prevailing upon the TV-sters to tear down a single tower, either for the communal tower idea or for "farm" purposes, the next order of business is to force the Air Space Subcommittee to bear down on having the existing towers adequately marked.

With this thought in mind, *SKYWAYS* presents herewith a round-up of opinion gleaned from fruitful sources. These opinions deserve careful consideration by the new Working Group, followed by prompt action on the part of the Air Space Subcommittee.

1. The adoption of a strict policy regarding marking in general, with severe penalties provided for failure to comply.

2. Immediate steps should be taken to have antenna guy wires adequately marked so as to be visible at all times insofar as it is possible. This includes suspending metal balls, or wind-sleeves, at the center of each wire for daytime use, and flashing 100-watt lamps at the same point for low-visibility conditions.

3. An effort should be launched to establish a trend toward the use of single, communal towers in all cities. A start in this direction must be made sometime and now is as good a time as another. The Government must lead the way here in pointing out the advantages to all TV-sters in a community of using the tallest tower there.

4. Maintain an open mind about "antenna farms" as championed by C. A. Parker, Exec. Secy of NATA. According to Parker, where a number of towers are clustered together they are more easily seen—and hence are avoidable. There are several localities where this system is ideal.

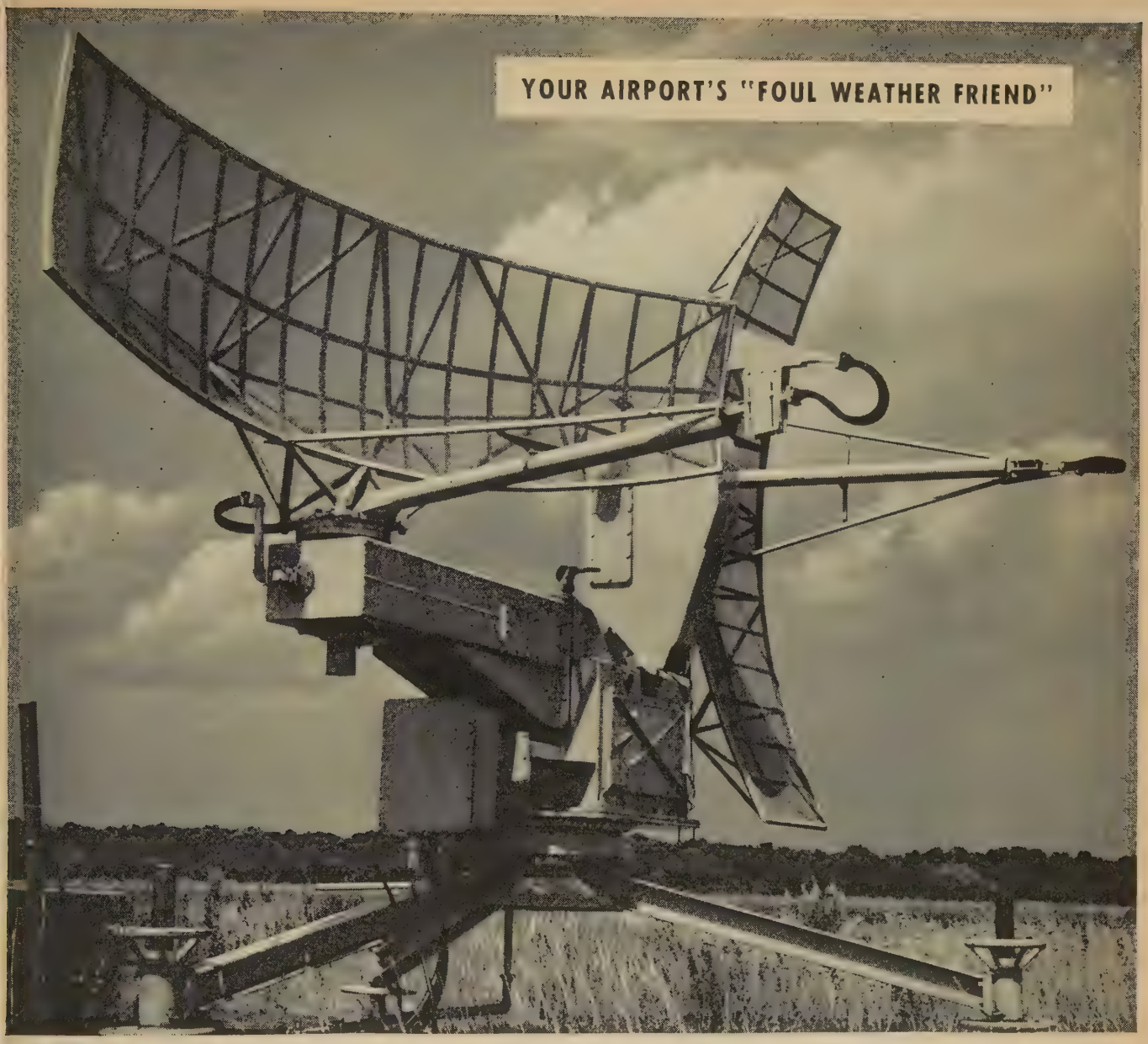
5. Arrive at a method of perimeter marking—arrows pointing to the tower from half a mile away, or a large circle placed at the same distance—in order to give an added warning on dim days.

6. Institute with all possible haste a project for the development of an *audible* warning device similar to those the British used with great success during the late war. These were small automatic transmitters, with 5-mile range, which warned pilots of the proximity of mountains and barrage balloons. The devices are obsolete now, to be sure, but the idea behind them offers an excellent jumping-off place from which the bright electronics minds can plunge into their job.

7. Most important of all is for all parties concerned to stop vacilating and get down to work. According to Max Karant, voluble voice of AOPA, there is nothing insuperable about the tower situation; all that is needed is for the proper people to get feverish about the job at hand and it will be cleared up almost overnight.

To the above program *SKYWAYS* offers two additional suggestions:

1. That future deliberations include Mrs. Blanche Noyes, a practiced pilot, Chief of CAA's Air Route Marking Section, who after some 20 years experience in aerial marking is probably better versed on the subject than anybody; and 2, in the event that the electronics brains bog down on the matter of lights, we urge that Mr. Charles Adler, Jr., renowned signal engineer of Baltimore, Md., be called into consultation. Mr. Adler, it will be recalled, is the individual who invented the present blinker running lights for aircraft and gave his patent to the American people. A good man to have around when signal lights are being discussed.



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Instrument Lighting

(Continued from page 11)

sealing gaskets are employed at the outer diameter on the inner surface of the window glass in order to accomplish hermetic sealing. Between the case assembly flange and bezel ring is a non-metallic spacer, making up for the depth of the pointer and lamp-mounting assemblies. In all instances, the spacer has been so designed and the bezel ring modified so that all dial markings are visible through a 60° solid cone.

Light Source

The light source for this design has centered around an AN3136-special base instrument lamp rated at 3 volts and .19 amps. This bulb with its screw-thread base is easily gripped with the fingers and affords ease of replacement by the pilot. No special tools are required. The lamp mounting assembly consists of a lamp bushing, finned on its front sides and a maximum of 5/8 inch in diameter. This bushing is made of brass or aluminum and painted a dull instrument black color. This bushing is fused to the outer face of the window glass assembly.

The other half of the lamp mounting assembly incorporates a parabolic reflector and a glass or plastic red filter lens. This assembly is fused to the center bus bar of the inner face of the window glass assembly. The filter conforms to identification red as specified in AN-C-56.

The pointer light shield encircles the filter portion of the lamp mounting assembly, thus eliminating light losses.

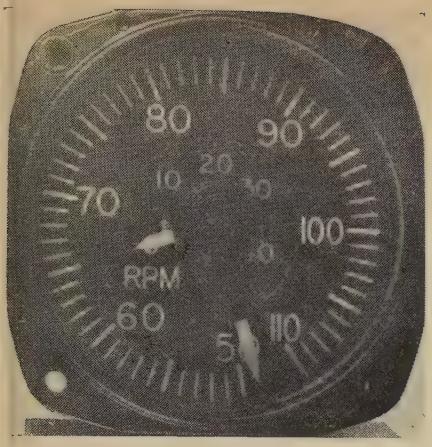
Fig. 2 (*page 9*) is an exploded view of the integral lighting system.

Let us now consider specific prototype instruments that were modified to the integral lighting system.

The instruments modified were the altimeter, airspeed, rate-of-climb, turn-and-bank, gyro horizon, G-2 compass, tachometer, tailpipe temperature, fuel-flow indicator, and volt-ammeter.

The three-pointer altimeter was modified to a full plastic engraved dial with plastic barometric scale, aluminum spacer, conducting glass and lamp assembly. The plastic pointer assemblies incorporate extension collects to accomplish their mounting. Through modification to the integral lighting system, the altimeter was increased in weight by 54 grams. (0.119 lb.)

The airspeed indicator (*Fig. 3*) was modified to present the original viewing configuration. The Mach number sub-dial was kept intact while



MODIFICATION *of tachometer is similar to rate-of-climb except for pointers*

THREE-POINTER *altimeter with integral lighting was upped in weight by 54 grams*

the airspeed dial indicating pointer, maximum allowable airspeed hand, window glass and lamp assembly were modified to the integral lighting system. The Mach number dial receives low-level illumination from the cut-out in the main plastic dial. The airspeed indicator weight was increased by 65 grams.

The rate-of-climb indicator (*Fig. 4*) is a typical center-pointer instrument with integral lighting configuration. Here we have the minimum of parts required for integral lighting. The pointer can be easily observed and the center lamp assembly does not distract from the display. Weight of the rate-of-climb indicator was increased by 41 grams.

The turn-and-bank indicator gives an example of transillumination and integral floodlighting. The plastic dial in this case also allows for the integral floodlighting of the ball assembly. The "turn" hand is metal with a transparent plastic overlay at the indicating end and the hand contains a center opening to allow clearance for the lamp assembly. The light is beamed to the dial from the lamp assembly and in so doing, the "turn" hand picks up light, giving a transilluminated indication. The turn-and-bank indicator increased in weight by 39 grams.

The H-6 gyro horizon (*Fig. 5*) is a typical example of integral lighting of movable bar instruments. The rear bezel mask is engraved plastic, containing a reflector at the rear, and the horizon bar and airplane indicator are painted matte white and bevelled in order to reflect the light from these surfaces. Also, incorporated is a bezel spacer between the rear and front bezel assembly and a mask spacer for the airplane adjustment mechanism. The integral flood lighting of the instrument is reflected by the indicating bar and miniature airplane. The gyro horizon increased in weight by 69 grams.

The G-2 compass is an example of the integral lighting of concentric mounted dials giving very favorable results. The light from the lamp assembly is beamed into the small plastic correspondence indicator dial which acts as the main prism allowing the plastic airplane mask and plastic direction dial to be transilluminated. The instrument increased in weight by 71 grams.

The tachometer, when modified to the integral lighting system, gained 62 grams in weight. This modification is similar to that of the rate-of-climb except for two stacked center pointers.

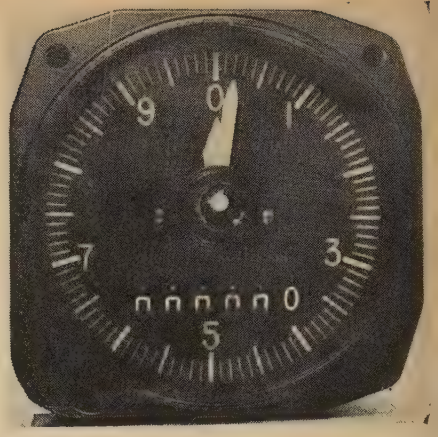
Integral lighting of the tailpipe-temperature indicator makes use of transillumination and integral flood lighting. The D'Arsonval movement assembly was left intact. The dial is engraved in plastic and a new case manufactured. A new masking plate is installed and the lamp assembly which receives its current by direct wiring is mounted in line with the pointer pivot axis. The light is beamed to a prism in the dial, whereas the pointer, which is painted matte white, receives direct illumination.

The fuel-flow indicator is a typical two-pointer modification with the addition of the counter. The counter obtains its illumination from the window cut into the main plastic dial. There was an addition of 65 grams to the weight of this instrument.

The dual voltammeter (*Fig. 6*) integral lighting required the use of a new cover plate with the T-1-1/4 bulb mounted in this plate at the bottom of the window. The current is brought to the lamp assembly by direct wiring. The dial is engraved plastic, partially transilluminated

(*Continued on page 38*)

MODIFIED *for integral lighting, this altimeter used U-type plastic pointer*



FUEL-FLOW *indicator is typical two-pointer modification with addition of counter*

Instrument Lighting

(*Continued from page 37*)

through edge lighting, while the pointers are illuminated by direct and reflected light.

Testing Results

Preliminary illumination brightness tests were accomplished on one prototype instrument, and measurements of brightness of dial markings, numerals, and pointers were taken with a Macbeth Illuminometer brightness meter. The tests were done in a dark room with the brightness meter mounted above the face of the instrument. With the lamp operated at rated voltage, a maximum brightness of 0.25 foot lamberts was obtained on the numerals and pointer. Variations in brightness over the dial of the instrument were a maximum of ±5%. Since these readings were taken, brightness has been substantially increased in this lighting system.

Daylight contrast tests were then run to determine the maximum contrast between the matte white markings and the dull black background. Illumination on the instrument dial was diffused and obtained from north-window daylight illumination. Readings were taken with the Macbeth Illuminometer with these results:

(a) Daylight contrast ratio between the instrument pointer and dial was 93%.

(b) Daylight contrast ratio between the white markings and the dial was 93.5%.

Conclusion:

From our work on the integral lighting of aircraft instruments, we conclude the following:

1. The lighting system developed by the Special Devices Center is showing definite promise of meeting the objectives we started out to achieve.

2. The development of new aircraft instrumentation should include integral lighting in its design, by the instrument manufacturers, and the approach and development that we have presented offers the means of accomplishing the illumination of these instruments.

3. Integrally lighted aircraft instruments can be used in conjunction with red floodlighting. The floodlighting will allow for high general brightness when exposure to intense light is encountered; whereas the integral lighting will supply illumination for normal night condition and extreme low-level adaptation requirements.

We have presented a method of integral lighting that encompasses the main requirements necessary for dark adaptation, that is, low-level illumination, minimum of reflections, and a minimum of light spillage on the instrument panel. We can envision that the principles and the methods of this lighting development can be readily incorporated in new instrumentation. It is also apparent that the over-all presentation of instrument data should be reviewed and human engineered to give the simplest, concise indication for the aircraft pilot's observation.

This lighting system does not obsolete our present-day standard aircraft instruments. It allows for the successful integral illumination of these instruments through modification of the basic configuration as has been delineated in the foregoing discussion.

With the presentation of these facts, it is hoped that the possibilities we have established will be used to their full extent to increase instrument flight proficiency through increased instrument legibility in all types of weather. ✈

Mirror Aids Landings

(*Continued from page 13*)

of the earlier trials, technicians had made a cast mirror, shaped like the segment of a cylinder with the inside polished. This curvature was found necessary to enable the pilot to pick up the blob as he turned for the final approach, the plain flat mirror having tended to make the minimum straight approach too long for practical operations. This new mirror was mounted on the port side.

For this series it was decided to obtain the opinion of a number of pilots and so some 20 were selected, including United States Navy flyers on exchange duties in Britain. *Sea Vampires,* Wyverns, a *Meteor* and a Gannet were chosen as their mounts.

More than 100 landings, by day, at dusk and at night, were made without any accident whatever. On completion, all the pilots agreed that these night landings were less hair-raising. In fact, the first pilots to land at night during the test had never done so on a carrier before.

It was discovered that little practice was needed with the mirror sight and that there were no reaction delays such as are inevitable with an LSO. This is scarcely surprising, since the speed of the robot signal is the speed of light!

Apart from these fairly obvious conclusions, it was found that the light beam from the mirror gave the ideal straight approach path for the landing technique envisaged for use with the angled deck. Instead of lobbing over the round-down, the aircraft can swing down on a comfortable curve with a descent angle approximating 3°. Assuming that the flight path is angled, the pilot need not cut his engine until he is well and truly arrested by the wires. He can, therefore, fly off again if the need arises. In very bad weather, with the ship pitching, the approach angle can be increased.

Effect on Carrier Size

These developments in technique not only ease the task of the pilot but also the tactical and strategic problems of those senior officers whose duty it is to formulate the staff requirements upon which the shape and size of future aircraft carriers depend. They mean that Naval authorities can choose a size for their carriers and not be forced by new aircraft design into having mammoth floating airfields and too many eggs in one basket. If great concentrations of force are required, the very big carrier remains the answer, but they are large targets and the loss of any one must be a disaster in terms of men, aircraft and material.

There remain at present certain minimum requirements for the flight deck, even when angled and provided with mirror sights and steam catapults, and it is doubtful whether very small carriers, such as the wartime escort carriers, would be economical in terms of men to fighting power. But the medium-sized carriers, termed light fleet carriers by the Royal Navy, are given a new lease on life and, in fact, such carriers may offer the best dividend in the years immediately to come and provide for more effective dispersal in the face of atomic attack. Given a number of them, great concentrations of force can be achieved.

Be all this as it may, the important thing is that, with these new flight deck techniques, the landing problem will, above obvious lower limits, cease to dictate the over-all size of carriers. With a clear understanding of them, it is possible to foresee the shape of Naval aviation for the next decade, at the end of which, if vertical ascent and descent by combat aircraft have become commonplace, minimum limits may be reduced. ✈✈✈

Skyways Round Table

(*Continued from page 18*)

use the commercial airlines for transcontinental trips. Since many of the factories we travel to are located in places not served by commercial airlines, the majority of our flights are to these smaller airports. If these airports have been allowed to deteriorate because of lack of funds, business flying will be slowed down considerably.

"Our further contention is that there ought to be some Federal aid to some of these other airports. It took us quite a while to instill confidence in air travel in our executives, salesmen and plant personnel. These men are using business aircraft and scheduled airlines at the present time instead of other types of transportation. What we accomplished throughout the years could be wasted if the airports we use most of the time are left to deteriorate to the point where they are considered hazardous. This would not only hurt business flying but aviation as a whole".

John Geisse (*Airport Consultant to AOPA*): "I would like to ask Mr. Brenner what has happened since 1946 that has changed this whole picture so that we have no national interest in private flying and small fields? The Airport Act of 1946 was passed primarily on the basis of assistance to small fields. At that time, 6,000 fields were contemplated. The McCarran Act specified that only 35% of the total funds would go into Class 4 or larger airports. But something apparently has happened between then and now to change the picture. Congress at that time was thoroughly convinced that private flying probably was as of as much interest and may be more interest than scheduled flying.

"As far as national defense is concerned, I think that we're all ready to recognize that all phases of aviation contribute to national defense. The airlines certainly can contribute to the air logistics and they can provide some big airplanes. But is that all that aviation can contribute? We've gone through two world wars and Korea and I think all three have demonstrated quite clearly that the private flyer in these small airports has a tremendous amount to contribute to national defense. They contributed something like 300,000 trained pilots in World War II. They've contributed to the training facilities at airports and the Navy during the war. What's happened to that interest in private flying and the small airports?

"It is my impression that you've asked now for about $22,000,000 for an airport program. It also is my information that probably all that money will be spent on your major hub airports, which is about 20 instead of 760 which you say meet the criteria."

Fred Glass: "*Before we answer your questions, Mr. Geisse, Mr. Post has a question.*"

Wilfred M. Post, Jr., (*American Assn. of Airport Executives*): "I have a question I would like to ask Mr. Brenner. In the survey of the number of airports that are eligible—I think it was 760—do you have any idea how many airports are not served by airlines?"

Mel Brenner: "I don't have the figure readily at hand, but I think it is about 330."

Wilfred Post: "Then there would be about 430 airports being served by airlines and 330 that do not have airline operations?"

Mel Brenner: "That's about right."

Louis R. Inwood (*Airport Operators Council*): "I think the charge of discrimination is the other way around. I don't look with any great alarm, as Mr. Geisse says, at the change in the airport program. I think that most of us have failed to remember that we are in a very critical period, when large amounts of our tax money are spent on national defense. There is a limitation on the amount of spending the Federal Government can indulge in. I'm as much interested in private flying as I am in any other phase, but I don't think this program is limited to 20 airports or anywhere near that. Take any of the top 35 airports and you won't find a single airport in the system that has made over a 10% contribution, so far as funds are concerned, in the airport programs of the past. Most of them are well below that.

"A criteria that suggests any airport where there are 30 airplanes based is eligible for Federal aid certainly is a broad concept and gets down to a great many grass roots airports. It has been indicated here that it even goes beyond that. With all respect to corporate flyers, I think that 50% of the corporate flyers' traffic winds up at one of the 35 airports and the other 50% winds up at a multitude of smaller airports.

"In the national interest, there's a line at which support must be drawn. We have had times in the past where

(*Continued on page 42*)

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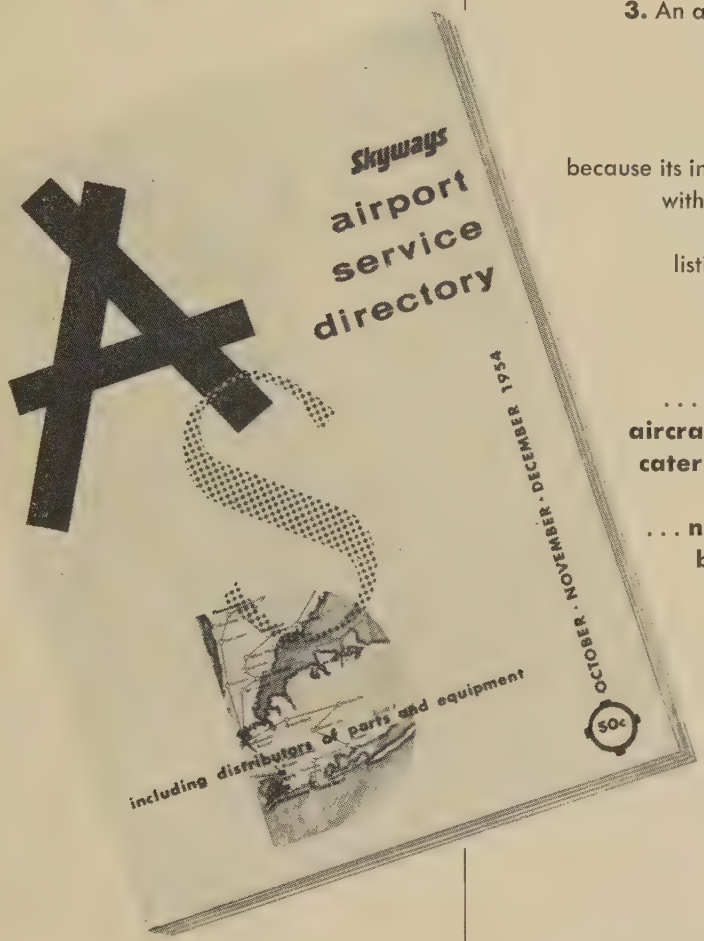

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Skyways Round Table

(*Continued from page 40*)

we depended upon the Federal Government solely for funds and looked on it as coming from Uncle Sugar. Now I think we've got to be realistic and let the Federal Government take care of the national interest.

"I would certainly advocate that the state and local communities and individuals should have good sound programs of fostering the smaller airports. But I don't think it is Uncle Sam's problem, with a tight Federal budget, to go clear down the line to Farmer Jones and his private airport. That would be nonsensical and nobody would advocate it. There must be criteria and it is my opinion that this criteria help towns of around 5,000 to 10,000 in several instances. The figures will prove that Federal funds have been distributed far and wide."

Fred Glass: "*Mr. Geisse, do you want to make any comment on Mr. Inwood's remarks?*"

John Geisse: "I'm sure Louis didn't intend to deceive you on the percentage of money going into these airports, or about the percentage of Federal funds as compared with local funds. Out of the total Federal appropriations to date, 80% of the Federal money has gone into the larger airports, and only 20% into the small airports. This is against the original intention of putting only 35% into airline terminals."

Louis Inwood: "I also have investigated those figures and the 35 top airports haven't taken 80%."

John Geisse: "I didn't say they had. Of 1,154 airports, 762 in Secondary and Feeder classes received $32,000,000; 331 in Trunk and larger classes got $128,000,000, which happens to be 80% of the total."

Louis Inwood: "That's 300 and some odd airports and some of them are in quite small communities. Some communities have been oversold on the size of airports. They could well have had a Class 2 or 3 but for some reason wound up with a Class 4. Seventy percent of the traffic goes to about 35 airports and they are being continuously picked on, although they have received much less money than is indicated in that program."

John Geisse: "You point out that our economic situation is now quite different from what it was some time back, so that we've got to be a little more careful about how much money to spend. Would that not be equally applicable to money spent with Class 4 and up airports?"

Louis Inwood: "Certainly."

John Geisse: "Then I don't see where it enters into the discussion as to distribution of the funds between the small and the larger airports."

Fred Glass: "*Mr. Inwood is making the same point made by Mr. Brenner —that it is obvious that in the development of all 6,000 airports, there just isn't enough money to go around. Therefore, we come to the question of maintaining the proper balance.*"

Louis Inwood: "There should be some local responsibility and initiative forthcoming on the part of individuals. To interpret the figures accurately, I said that the larger airports have benefited less, percentage-wise. The large airports, those 35 I was talking about—have less than 10% contribution and they have to dig up the 90. At some of the smaller airports it gets closer to 50-50, which is right and proper. It is true because these larger urban communities contribute a whale of a lot more tax dollars than some of the smaller ones."

John Geisse: "I would like to point out that the average allocation to the Class 1, 2 or 3 airport is $25,000; the average to the Class 4 and up airport is $387,000. I think you have to keep these figures in mind when you're talking about the limited amount of money available."

Samuel Freeman: "Twenty-five thousand dollars for a Class 1 airport is going to do a lot of promoting of aviation in that area, whereas the $386,000 which might go to extend a runway on an already existing Class 3 or 4 airport would merely mean that an airline can use Convairs instead of DC-3's. It would be an advance in aviation but not to the same extent. We have a large number of airports in this country that do not qualify for any aid. These are the privately owned commercial airports which numerically represent more than three-quarters of all airports in the country. Those airports don't qualify for anything and they have no security today. Yet, as far as the private pilot is concerned, 9 or 10 airports he goes into are privately owned commercial facilities."

Fred Glass: "*We have one other gentleman that we should hear from on this—General Milton Arnold.*"

Brig. Gen. Milton W. Arnold (*Vice Pres., Air Transport Assn.*): "It is rather unfortunate that this dissension exists among the segments of civil aviation. I think, as Mr. Geisse and others have said, that it's a problem for aviation as a whole. The tendency has been to assume that at the 550 certificated stops in the U. S. airport expenditures have

een for the airlines alone. One of ıe most serious problems we have oncerns the local service airlines. oday, it is the volume of local serv-e airline traffic which we are anx-ous to develop. For instance, 80% f all traffic today is long-haul traf-c. Yet the potential number of assengers in short-haul traffic is bout 50 times that of long-haul affic. And at the present time we ave only 4% or less of that poten-al. Some 50 of those 550 stops av-raged only 1/2 a passenger per stop ast year. No one gets anything out f that, but it's classified as airline ervice. Mohawk is a local service perator. It has to pay for H markers nd other things because you have riteria that say where the ILS is oing, which doesn't assure the local ervice carriers of the necessary navi-ational aids.

"What kind of formula is proper? 've never heard of one yet that was atisfactory. All phases of aviation ere represented on the Department f Commerce Panel and we attempt-d to develop a recommendation on ow to work airport aid criteria. It as been my experience that Con-ressmen have to have something efinite to act on. You have criteria or ILS. They may not be proper, ut at least these criteria attempt to ook at the problem from the stand-oint of total traffic.

"Some statements have been made n regard to performance of jets and heir noise. That's quite a problem ll its own but here's my opinion n the subject. We are going through n era of jets, an era of increased peed, and development is an abso-ute must as it is in the interest of ational defense. I think 15 or 25 ears from now we're going to talk bout the performance of huge air-lanes landing in 200 feet and stop-ing, but there will have to be much mprovement in jet performance be-ore that. Just a little bit of rain on our runway increases by approxi-ately 12½% the required run for jet ombers today. That's how critical is. I think we must expect continu-ng requirements for longer runways or many years. One department in he military has $30,000,000 this ear to put into research on naviga-onal aids. Yet we talk here about a rogram for civil aviation of $20,-00,000 for the whole United States."

red Glass: *"Mr. Brenner, I'd like o ask you to make a few remarks t this point."*

lel Brenner: "First, it should be ade very clear that the basic issue oes not relate to the desirability of ll airports—those with limited aero-

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Skyways Round Table

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nautical activity as well as those with heavy activity. Obviously, airport development of the widest scope is desirable. However, the basic question relates to the appropriate division of financial responsibility between Federal, state and local governments, taking account of current fiscal conditions. There is a strong local interest in the development of any particular airport. There is also a national interest, and the relative balance between the local and the national interest will vary for different airports. On this general point, it is pertinent to quote the Airport Panel, which was appointed to get the views of the industry concerned and which included in its membership a cross section of the aviation industry. One of its recommendations was as follows: 'The determination of whether there is sufficient national interest to warrant federal participation in a particular airport project should be based on a demonstration of tangible aeronautical necessity in the area served.' The Panel further recommended: 'A thorough revision of the National Airport Plan based on sound criteria designed to gauge the tangible aeronautical necessity of the area served or to be served by the airport.' Basically, that's what the Department has tried to do—to make this determination of where there is 'sufficient national interest to warrant Federal participation.'

"The question has been raised, 'What has happened since 1946?' One thing of some significance is that we are in a different fiscal climate than was then anticipated. When the 1946 Act was passed, there was generally expected a substantial post-war easing of the fiscal strain in the Federal budget. In fact, it was felt that large public works programs might be needed to overcome a post-war unemployment problem. The Airport Act was passed with a total authorization of $520,000,000 for seven years, of which a maximum of $100,000,000 was authorized for appropriation in any one year. The program started at a level of $45,000,000 and it was at $40,000,000 for a few years. Then the Korean emergency came along and, as part of the resulting economy drive, the program was cut back to about $25,000,000, then $18,000,000 and finally to $14,000,000 in 1953. Of that $14,000,000, only $11,000,000 was available for distribution to projects within the continental United States.

"We are still in a tight fiscal position. The airport appropriation request for fiscal year 1955, as approved by the Budget Bureau and the President for submission to Congress, is $22,000,000.

"If this 22 million dollar request is appropriated in full, and if its distribution follows the same pattern as the 1953 appropriation, there would only be two states that would receive over $1,000,000 and only five states would receive between $750,000 and $1,000,000. In the light of all these circumstances, and in line with the recommendations submitted by the Airport Panel, the Department felt that the public interest would best be served if these limited funds were concentrated in a selective manner, on the basis of relative national interest. Were it not for the fiscal limitations now controlling the size of this program, a different set of criteria would presumably have been developed.

"In developing these specific criteria, the Department was trying to find a basis for spending limited funds in a manner which would yield the maximum return—not just for the airlines, and not just for general aviation—but for the aviation system as a whole. The Department has emphasized that these specific criteria are not fixed for permanent future application, but rather will be subject to adjustment on the basis of changing circumstances and developing experience."

Fred Glass: "*Are airports lagging behind the general development of aviation as a whole? In the development of airports, is undue emphasis being given to facilities for one particular kind of traffic or type of carrier to the detriment of another? Should we place greater emphasis on improving the acceptance rate and the ability of existing airports to handle traffic, or should we start looking to new airports? Are we attempting to mix military and civil at certain fields to the detriment of the full development of civil aviation in the future?*

"*General Arnold, will you give us your views from the standpoint of the air carrier?*"

General Arnold: "The problems associated with these questions are very serious. In my estimation, one of the biggest problems is the development of facilities such as ramps, taxi-ways, runways and landing approach areas. Airport ground transportation is lagging far behind our improvement in handling traffic in the air. That's due to the fact that at times selection of airports is one of real estate. We're running into more bottlenecks today in handling aircraft on the ground than we are in handling them in the air. The solution is much more difficult because it has to apply to airports individually. No one solution can answer the problem at all airports.

"For example, there's the problem of smaller airports. At one New Jersey field, which averages about 6 to 10 passengers a day, three people in our organization spent a total of two and one-half years trying to iron out a silly little problem of whether the airport should be paved or remain as a grass field. About 80% of the flying there was private flying.

"I think that the problems associated with the utilization of airspace, the mixing of traffic, restricted areas, prohibited areas, warning areas and utilization of airport real estate in moving aircraft once on the ground are much more serious today than the problem of the airport's acceptance rate. We decreased the acceptance rate from an average of about 12 to 15 minutes to an average of 1 minute 50 seconds or 2½ minutes. That's a 700 or 800% improvement. I don't think we've managed much over 15 to 50% improvement in our utilization on the ground. We still don't know how to load airplanes, move them and get them off the ramp."

Fred Glass: "*Mr. Strohmeier, do you have any comment on that?*"

William Strohmeier: "There are approximately 16,000 urban areas in the United States and apparently only 6,000 have airports. There are about 10,000 urban areas which should have some type of airport facility. As these other towns get their airports, there won't be the congestion at the existing fields.

"As far as getting along with the airlines is concerned, I think that developments around Washington are interesting. This 180-mph speed restriction in congested areas may be the answer. The idea of controlled VFR may be a little distasteful to a lot of us, but I'd rather have a little control and announce my arrival in such an area and have them know I'm around. With radio being what it is, particularly VHF, that won't become much of a problem."

Fred Glass: "*Mr. Clark, you and Mr. Dubanowich fly into and out of all kinds of airports. Do you have any comment?*"

Wray A. Clark (*Pilot, Great Lakes Pipe Line Co.*): "I've felt strongly that we should reduce multiple runway airports to single runway airports by the utilization of cross-wind gear. The use of single runway airports can solve both your noise problem and your approach problem. Having traffic on a single-runway air

port simplifies ground handling, too. The high cost of land acquisition and distances from cities point to the fact that everything should be geared to single-runway airports."

Fred Glass: "*Mr. Benscoter, as Vice President-Operations of one of our largest local service airlines, you have been operating into small airports that have never had service before, and you are also operating into larger airports designed prior to the advent of local service airlines. What recommendations would you make with respect to the development of airports, particularly with reference to the handling of high-density, short-haul traffic?*"

Carl A. Benscoter (*Vice Pres., Operations, Mohawk Airlines*): "I have one comment on the proposed criteria for Federal aid that I think is applicable. We have been concerned recently by the CAA use of this magic criteria for justifying installation of facilities. The installation of facilities at some of the intermediate size airports has not kept pace with the airport problem itself. We have one airport in our system which has twice justified an ILS installation. Each time we came to get the installation the criteria had moved up. I feel that our civil aviation policy-making people should have enough intestinal fortitude to make some plans based upon weather experience in these locations and say that this airport should have an ILS because the weather requires it be there. It should then be installed for reliable and efficient service.

"In our system we also have three smaller airports, one which we cannot serve except by helicopter; a second, restricted operation for DC-3's: and a third which today is limited to DC-3's on which we can operate without restriction but on which it is impossible to use larger equipment. The local service industry of which Mohawk Airlines is a part, has been put on notice that we are to obtain or make sufficient progress toward self-sufficiency—or else!

"The best source of revenue we have is from the 245,000,000 people who take trips of 250 miles or less. Last year we carried only 9,000,000 by air. That's the market we have to enter. That's the market on which the airport development people should spend a good amount of time and effort for the best use of these limited funds.

"My recollection is that the Federal Airport Act of 1946 provided $500,000,000 to be spread over a period of seven years. That was a very ambitious program and obvi-

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NBAA Dallas Convention to Cover Many Important Subjects

(Continued from page 23)

ber-pilots of the organization.

A display of new business aircraft and related equipment, including radio, instrument and accessories, at Love Field on the afternoon of October 29. Fixed-base operators at Love Field will conduct a ramp-side "hangar flying" meeting for visiting pilots and owners.

The annual business aircraft operators' forum, which will begin on Thursday and continue through Friday.

The annual dinner Friday night at which an "internationally-famous" industry executive will be the speaker and many social events extending over the three-day convention period.

Al Harting of Southwest Airmotive is chairman of the arrangements committee, assisted by Theil Sharpe, Collins Radio; Rom Lombardo, Temco; Jack Kemp, Dallas Airmotive and Dallas Aero Service; Jim Fuller, Bell Aircraft; and George Haddaway, publisher. H. M. Mallon, president of Dresser Industries, an NBAA member, heads a convention advisory committee.

Canadian Business Pilots Preparing to Organize

A Canadian Business Aircraft Association, patterned after NBAA, is being organized to foster the growth of that segment of flying in the provinces.

Business aircraft owners and pilots are being canvassed by questionnaire for their views on the type of organization needed, and when returns are tabulated a meeting will be held in Toronto for election of officers. At a later date, CBAA will decide whether to affiliate with Canadian Aviation Industries & Trade Assn. or Canadian Owners & Pilots Assn., or remain independent. Sponsors of the Canadian organization have maintained close liaison with NBAA in their planning.

Skyways Round Table

(Continued from page 45)

ously had certain waste contained therein. Today's proposed $22,000,000 program is just a drop in the bucket. I feel that the program should be designed to accomplish sufficient airport improvement for the business pilot, the private pilot and the small airline operator such as ourselves or be dropped entirely."

Fred Glass: *"What changes would you make or what additions would you recommend with respect to the adaptation of airports to the handling of your participation in this tremendous passenger market that you mentioned?"*

Carl Benscoter: "I believe that within 10 years the best method of handling that volume would be to have a larger passenger helicopter. I think in the meantime there can be sufficient airport development in cities of intermediate size to make it possible to enter that market through this airport development program."

Fred Glass: *"Sam, what are your comments on this?"*

Samuel Freeman: "First of all, I think we should have more airports. Today, we're losing too many. For one reason or another, we're not generating traffic and the private flying industry has fallen down in many ways. Frankly, it's all a vicious circle. A fellow buys an airplane and then discovers there are no airports at many of the places he wants to fly to. I think that any program which could be developed should aid the small airports. It should either aid in the development of new airports or help us to hang on to ones we already have.

"From the airline standpoint, more thought should be given to designing our aircraft to use existing airports. This could cut down some of these expenses for long runways."

Fred Glass: *"You've been operating small airplanes into some of the high density airports in the country. Have there been any unusual traffic problems? Are there any corrective measures that you would recommend?"*

Samuel Freeman: "As far as professional-pilot operations are concerned, there are many things that could be done to speed up the handling of traffic. NATA made the suggestion that at Idlewild, for example, some of the taxiways could be used for the landing of air-taxi type aircraft. Actually, the taxiways are better than the runways. It could be done under tower control and would completely minimize any interference on the part of our type of aircraft with those of the scheduled airlines. It also would enable us to avoid the slipstream hazard. When you come in behind a Boeing *Stratocruiser*, even five or 10 minutes later, it can be pretty rugged. I like the plan that Cleveland has of landing small aircraft on what they used to call the "mat" in front of the building. I think if procedures like that could be developed interference with scheduled airlines would be minimized."

Fred Glass: *"Mr. Kerr, you've been concerned for a long time with facilities at all kinds of airports. Do you have any specific recommendations to make in this regard?"*

Robert Kerr, Jr. (*Dir. Facilities, American Airlines*): "As a major carrier, American Airlines is mostly concerned with the future of approach zones in the operation of heavy aircraft and how take-offs will be effected. The second problem in long-range planning is for better access from community center to airports. These are two of the things we are most concerned about."

Fred Glass: *"Any further comment?"*

John Geisse: "Mr. Brenner and General Arnold both mentioned that there were representatives of all phases of industry on the National Airport Panel. I would like to ask whether the conclusions reported, concerning Federal assistance to larger airports, was supported by representatives of AOPA and NBAA. I would be very surprised if the AOPA organization supported any such findings.

"Relative to criteria, I don't think that anybody would raise the question as to whether there should or should not be some sort of criteria. But criteria for what—for the minimum-size airport you will go into or the size airport which is justified for a particular community? I think we agree that we shouldn't approve a Class 4 airport for a community that would be satisfied with a Class 2, but I don't think we would agree that no money should be put into the Class 2 airport. Your criteria has to be associated with the amount of money involved. The amount of money available for one state may be limited to $1,000,000. But isn't the question before us now whether that $1,000,000 could best be spent on building one or two big runways or building, say, 100 smaller airports?"

Mel Brenner: "The Airport Panel did include representatives of the organizations just mentioned. And it is my understanding that it was a unanimous report. As for the type of criteria, the Panel recommended

riteria to measure the degree of national interest. They spoke of a determination as to whether there is sufficient national interest to warrant federal participation."

ohn Geisse: "Wouldn't that have o be tied up with the amount of money? Is the national interest sufficient to put in $10,000 or is it sufficient to put in $50,000? Can you talk about national interest without associating the amount of money involved?"

Mel Brenner: "The Panel's recommendation has to be considered in the light of what had preceded its report. In 1952, before the recent re-evaluation, the CAA developed objective criteria for determining airport eligibility. They were criteria of the same general nature as the ones now proposed. They involved the use of enplaned passengers and the use of based aircraft as the two measurements to determine whether Federal funds should be spent at a given airport.

"The Panel report refers to those criteria. The Panel did not take any position on the precise criteria which were then established by CAA, but it did endorse the principle of using such measurements. That's what has been done. The specific criteria have been raised, in the light of current conditions, but it is still a question of the degree of national interest as compared with local interest in a given airport. Naturally, this does not mean that an airport which does not meet these criteria has no national interest. It's all a matter of degree."

Wilfred Post: "I hope that the proposed criteria that we are discussing is for a program of only a stopgap nature. Obviously, the answer to most of the problems is to have a Federal aid program of sufficient magnitude to satisfy the needs of cities both small and large. Knowing that during this period of Federal economic adjustment, funds will be limited, the American Association of Airport Executives is on record as being willing to go along with the proposed criteria this year. However, we feel that the great number of people served by the aviation industry and the importance of airports in the economics and defense of our nation now justifies a more substantial program of Federal as well as State aid. A steady increase will continue. With such growth, the criteria of eligibility should be re-evaluated so that all segments of the industry will be provided for in their proper order."

Louis Inwood: "I think I can shed

(*Continued on page 50*)

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SKYMART

Skyways Round Table

(*Continued from page 47*)

light on your question, Mr. Geisse. I was on that Panel. It was a unanimous report and it was made in the light of what Mr. Post just said—a practical matter to be reviewed."

Howard Dubanowich: "As I mentioned earlier, there are times when we fly our company personnel to the larger airports so they can board one of the commercial airlines. In some cases it takes our passengers as long, if not a longer period of time, to reach the airline terminal from the parking area than it does transporting them from our home field. We wonder if it could be possible to have joint use of some of the airline terminals for three to five minutes. It would save our people considerable time."

Louis Inwood: "A majority of our terminals hand out a set of instructions permitting that. I can speak personally for Philadelphia. We allow unloading directly at the passenger terminal for any corporate or private plane. We do not allow them to stand any longer than we allow an airliner to stay at a gate half a day. We also provide a separate terminal, air-conditioned, for private flyers from Philadelphia. A great many airports are doing the same. If they do not, they do as we do. We allow them to use the airline gates, and I think you'll find that is pretty generally becoming policy at larger terminals."

Howard Dubanowich: "Quite a few of the larger airports don't have such a policy, but if more of them would adopt joint use of these loading gates, we certainly would be very grateful."

General Arnold: "I'd like to point out that most positions in aviation represent compromises. When the report was issued by the Transportation Council of the Secretary of Commerce, all forms of transportation were represented on the Council. And the Council could not agree on the report. A special panel tried to resolve it and come up with a compromise recommendation. We spent exactly six hours because of the railroads' determination that the report be written to say that every penny spent on the airport program would be for national defense rather than

(*Continued on page 52*)

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(Continued on page 52)

Skyways Round Table

(*Continued from page 50*)

for national interest. The railroad interests insisted on this and voted for it right down the line. It began to appear that we'd have to call the Pentagon every time we decided to put a nickel into an airport.

"I agree with Mr. Benscoter that unless we have a minimum of $30,000,000 in the hat it's a waste of the taxpayers' money and is not to the advantage of aviation as a whole. I say this, although I can't prove it, that it takes from 2½ million to 3 million to administer the program. So once you get down below that level for a state like Illinois and give it a total of 1½ millions, I don't see how we're going to get much out of the program. I will say this in behalf of the Administration. They felt there should be no Act at all. But when the aviation interests came up with a program the Administration went out and fought for it. They should be given due credit."

Fred Glass: *"Mr. Leh, do you have any comment from the standpoint of one concerned with an over-all policy of one of our larger states?"*

John H. Leh (*Pennsylvania Aeronautics Commission*): "The Pennsylvania Aeronautics Commission has been vitally interested in the development of small airports. It has done perhaps more than any other state in that field. Because of a lack of funds—there's an economy program in our state just as in the Federal Government—the Commission has gone on the record as not approving any airport project until CAA has approved it. You can get my state to back up any development program sponsored by the Federal Government. In fact, we were among the first to match community funds with Federal funds for airports. The thing to do is to fight for further development of airports. The amount of money proposed for airports is not enough.

"Fewer than 15% of the airports in the United States are zoned, and with every passing year it becomes more and more difficult and more costly to zone areas around airports. I believe that getting good zoning around airports all over the United States should be part of this new proposed airport program."

Fred Glass: *"Mr. Johnson, we'd be delighted to have any comment you care to make on these various subjects we have discussed today."*

J. W. Johnson (*Sec., ACC Airport Use Panel*): "Thank you, Mr. Glass. I might explain for the benefit of those of you who are not altogether familiar with the Airport Use Panel that its membership is composed of representatives of the Departments of the Army, Navy, Air Force, the Office of the Assistant Secretary of Defense, the Department of Commerce, the Civil Aeronautics Board and a non-government Chairman. We usually get into an airport use problem after it has become controversial between two or more member agencies.

"With regard to the Civil Air Policy which was developed by the Air Coordinating Committee at the request of the President and which has been touched upon to some extent in our discussion today, the Panel was responsible for the preparation of only one subject, namely: 'Joint Civil-Military Use of Airports.' Inasmuch as that item has not been specifically mentioned, I assume there are no questions in that connection and, therefore, feel there is nothing I can add at this time."

W. E. Cullinan (*Chief, Airports Div., CAA, Region* 1): "In regard to the question of lag in the development of airports, I've found there is a very definite and substantial lag in the development of landing area facilities such as runway extensions, taxiways, aprons, approach zone clearing, etc. The lag is even more noticeable at airports served by local service carriers such as Mohawk, Piedmont, Alleghany and Northeast. Many local officials are reluctant to back an airport construction program exclusively with local funds if there is a possibility that, within a year, the Government may revive the Federal Airport program. They are reluctant because it would have cost the community twice as much as it would had they waited. I believe that a stabilization of Federal policy on the Federal Airport program and the criteria for eligibility under it, will clear the air and eliminate some of this lag."

Howard Dubanowich: "Under Secretary Murray mentioned that the two basic factors determining Federal airport aid are enplaned airline passenger traffic and numbers of based aircraft. Does the second factor take into consideration the number of based aircraft and utilization of one airport as against another?"

Mel Brenner: "The criteria that have been announced are necessarily general. They are an attempt to indicate in a general way what the standards will be. It has been emphasized that these criteria will be applied in a flexible manner, and with reasonable judgment. If there are special circumstances where the number of based aircraft is not an adequate measure of the use of an airport or its importance, it has been indicated that those special factors will be taken into account."

Mel Brenner: "Under present conditions, it was felt that some line had to be drawn in terms of the relative balance between the Federal and the local interest. Granting that in every case there may be a combination of both, in some cases the national interest will be more important and in other cases less.

"The criteria were not intended to limit aid to just the large cities and large airports. It is worth noting that a level of 3,000 enplaned passengers per year—which is one of the criteria—represents only about one-hundredth of one percent of the nation's total airline traffic."

Fred Glass: *"Gentlemen, thank you very much. This concludes a highly interesting and informative Round Table."*

The supplemental appropriations bill, containing $22,000,000 for Federal aid to airports in the manner discussed in the forgoing Round Table, passed both Houses of Congress in August and was referred to conference for debate on non-aviation items. Possible modifications in proposed criteria for airport aid will not be discussed until after the bill is signed by the President.—Ed. Note.

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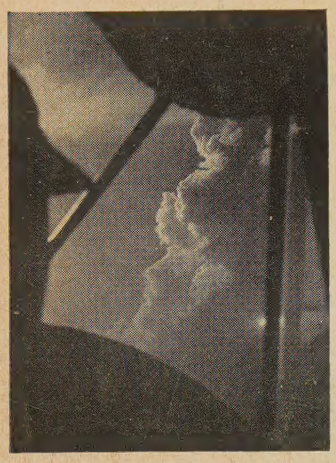

To lessen chances of lightning strike, slow down your air speed, stay out of clouds, especially when gauge indicates near freezing temperatures or precipitation.

Scattered fast-moving low clouds on a calm, clear morning indicate strong surface winds will soon develop because sun's heat stirs the winds from aloft to the ground.

Clearing, with a wind shift to west after a thunderstorm, does not always signify passage of a Front—but possibly a pre-frontal squall line. Another band of showers and cloud may follow in an hour or two with the real frontal wind shift.

Clouds made up of dry-snow crystals appear fuzzy around the edge. Water clouds have a hard, sharp outline. It is the latter type which presents the greater icing hazard.

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